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# A NEW GEOGRAPHY OF
# INDIA, BURMA & CEYLON

BY

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*WITH MAPS, DIAGRAMS AND ILLUSTRATIONS*

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# PREFACE

It is now over twelve years since the first appearance of the volume entitled 'The Indian Empire' which formed Part IV of *Longmans' Regional Geographies of India.* Much has happened since that time, not only in the affairs of India but also in the teaching of geography and the present moment seems opportune to replace the old work by a volume which is largely new. The year 1937 marked the creation of the Provinces of Sind and Orissa as well as the separation of Burma from India with the consequent separation of its statistics from those of India proper. These changes necessitated in any case the rewriting of much of the geography of India and it seemed only proper that a new India should be treated in a new work. As a delegate to the Silver Jubilee Session of the Indian Science Congress in 1937-8, I had the opportunity of revisiting some eight of the major provinces of India and a number of the more important States and of discussing geographical problems with workers on the spot. I have been enabled to incorporate much information of importance collected on that occasion. I hope also that the illustrations, now included for the first time, will add to the general usefulness of the book.

Whilst the importance of the natural region and the emphasis on cause and effect have been retained, it will be found that I have made, as far as possible, the account of each Province and State complete in itself.

*May* 1938. L. D. S.

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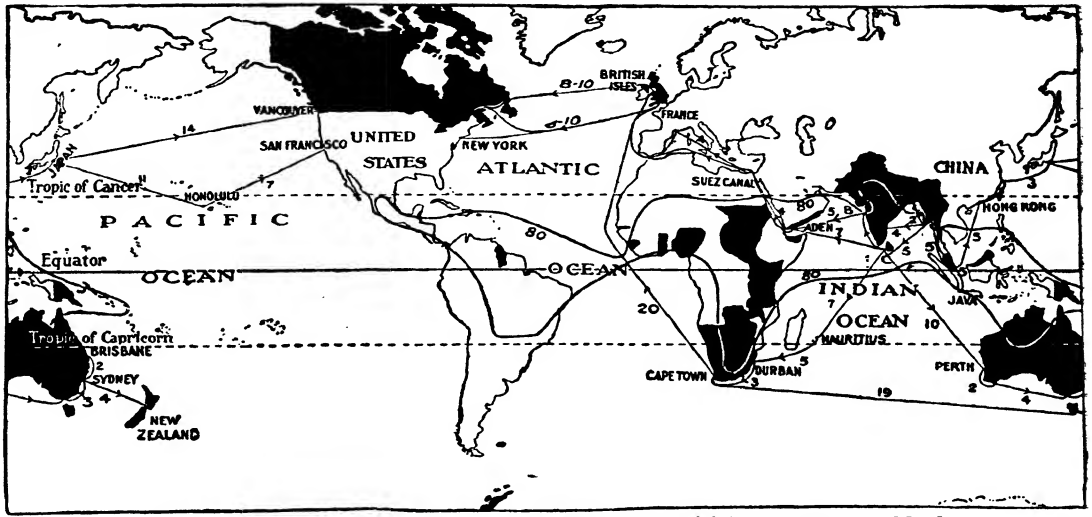



**Fig. 1. Map of the World, showing the British Empire in black**

The principal steamer-lines from Rangoon to other parts of the world are shown, and the number of days' sailing for each stage of the journey. An average rate for a modern steamer is 300-400 miles a day. It should be understood that the fastest ocean liners do the journeys shown in a much shorter time. Thus the crossing of the Pacific from Japan to Vancouver is normally only ten days by a large liner.

# A New Geography of India, Burma and Ceylon

## CHAPTER I

### POSITION AND SIZE

1. **India, Burma and Ceylon.**—The areas we are going to study in this book consist of three separate countries—India, Burma and Ceylon. India is by far the largest of the three and until 1937 Burma was simply one of the Provinces of India. Burma is really very different and is separated from the rest of India by a wall of mountains. In the same way Baluchistan although a part of India is a dry plateau somewhat cut off from the rest of the country. To the south of India is the island of Ceylon, which does not form part of the Indian Empire but which is closely connected by its geography with Southern India. The Indian Empire is divided into a number of Provinces and States, about which we shall learn later.

India, Burma and Ceylon are each members of the great 'British Commonwealth of Nations' or 'the British Empire' which you can think of as a large family of nations joined together for the common good.

2. **The Position of India.**—There are seven great land masses in the world which we call continents. India forms part of the largest of them, the continent of Asia. Look at a globe, or a map of the world on which the equator and the Tropics of Cancer and Capricorn are marked. Notice first of all that India is entirely

north of the equator. It is in the Northern Hemisphere. But the Northern Tropic or the Tropic of Cancer passes right through India. Part of the country is north of the tropic and part is south. This is a very important fact for you should know that the sun shines vertically on all places between the two tropics

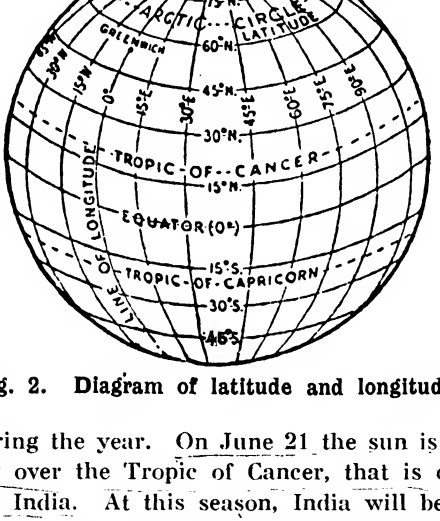



**Fig. 2. Diagram of latitude and longitude**

twice during the year. On June 21 the sun is shining vertically over the Tropic of Cancer, that is over the centre of India. At this season, India will be a very hot country. You will learn about temperature in a later chapter, but remember that the countries inside the tropics are the hottest in the world. India is very nearly inside. Fig. 1 shows you the position of India compared with other countries of the world.

3. **Longitude.**—India lies to the north of the equator. But in order to express the position of countries on the world more exactly, the earth has been divided up by imaginary lines. A circle is divided

into 360 equal divisions called degrees. The equator, running round the earth is a circle and is divided into 360 degrees. Lines are drawn through the north and

**Fig. 3. The different countries of the British Empire showing their comparative sizes**

south poles and across the equator, one degree apart. One of these lines, the one passing through a place called Greenwich, which is part of London, is called 0°

and we count east and west from this. The line of 88° East passes through Calcutta. These lines are called lines of longitude. India stretches from longitude 61°E. to 101°E. That is through 40 degrees of longitude or one-ninth of the way round the globe.

4. **Latitude.**—If we travel from the equator to the poles along a line of longitude, we pass through a quarter of a circle or 90°. The equator is called 0° and the North Pole 90°N. and there are 90 degrees of latitude between the two. India (including Ceylon) stretches from 6°N. (Cape Comorin the southernmost part of India, is in latitude 8°N.) to 37°N.—that is through 31 degrees of latitude or more than one-third of the distance from the equator to the poles. Remember that the Tropic of Cancer is 23½°N.

5. **Size of India.**—You will now understand that India is a very big country indeed. From the north of Kashmir to the south of India is over 2,000 miles, and from Baluchistan to the north-eastern corner of Assam is over 2,200 miles. The area of India is 1,570,000 (over one and a half million or 15 lakhs) square miles. The area of Burma is 233,000 square miles and that of Ceylon 25,300 square miles. So Burma is nearly ten times the size of Ceylon, and India is over six times the size of Burma or sixty times the size of Ceylon. In Fig. 3 the size of India is compared with other countries in the British Empire.

6. **Local Time.**—The world turns completely round from west to east once in 24 hours. Although to us the sun appears to rise in the east and set in the west, the sun is really fixed and it is the earth which moves—turning round from west to east. Since the earth turns completely round—that is 360 degrees in 24 hours, it turns through 15 degrees in an hour or

1 degree every four minutes. Now places in the east will see the sun before places in the west. Calcutta is in longitude 88½° East. Therefore Calcutta will see the sun rise 88½×4=354 minutes or 5 hours and 54 minutes before Greenwich does. Another way is to say that the sun will reach the highest point in the sky, that is it will be noon or midday, at Calcutta 5 hours and 54 minutes before it is at Greenwich. If you went to the west of Greenwich the sun would rise later than at Greenwich. Here is a little rhyme to help you remember this:—

Go to the east, Greenwich time is least,
Go to the west, Greenwich time is best.

When the sun has reached the highest point in the sky at any place it is 12 o'clock noon by local time at that place.

7. **Standard Time.**—You will see that nearly every place in India has its own 'local time' and the clocks at Delhi would show a different time from the clocks at Lahore, or Bombay or Madras. Now this would be very difficult, so one time has been adopted for the whole of India. This time we call Indian Standard Time or Indian Railway Time which is 5½ hours in advance of Greenwich time. The only place in India which uses its own local time is Calcutta. If you live in Calcutta you know that the clocks in the city are 24 minutes faster than the big railway clock at Howrah station. Burma has its own 'Standard Time' too—taken from the city of Rangoon—6½ hours ahead of Greenwich.

8. **Maps.**—In this book we shall be using large numbers of maps. Try to remember that a map is like a picture. If we could get very, very high up in the air, we should look down on India and see first its outline or shape, the principal mountains and rivers

and we could easily draw a picture of it on a small piece of paper. That picture would be a map. But there are so many things in India that you could not show them all on one picture. So on a map we only show just a few things. Some maps are drawn to show the mountains, others the rivers, others the towns and so on. Others show just the outline of the country and we can mark on it signs which mean different things. Thus we can shade a map, using one kind of shading to indicate where heavy rain falls and another kind to indicate where light rain falls.

9. **Scale of Maps.**—Since a map is really a small picture of a country, very many miles in the country are represented by a few inches on the map. This we call the scale of the map. Look at Fig. 196. The scale is marked at the bottom. It is 530 miles represented by one inch. There is also a line drawn on the map marked '300 miles'. The length of that line represents 300 miles in the country. Practise using that scale. What is the distance from Bombay to Calcutta? Delhi to Colombo?

If one inch on the map represents 530 miles, one *square inch* represents 280,900 *square miles*. Now trace one of the maps in this book on to squared paper and find the area.

### QUESTIONS AND EXERCISES

1. What parts of India are in the Temperate Zone?

2. Name four towns in India which are just on the border between the Torrid Zone and the Temperate Zone (the region between the two Tropics is the Torrid Zone, outside are the Temperate Zones).

3. Where does the sun rise earlier, Karachi or Calcutta? Why? What is the difference?

4. Name the ten largest countries in the British Empire, in order of size.

5. Trace a map of India on to squared paper. What area of India is in the Torrid Zone? (This question, and the exercise at the

end of the chapter may be made part of an arithmetic lesson. It is very important to put lessons learnt in arithmetic to some useful purpose like this.)

6. What are the latitude and longitude of the following towns: Bombay, Delhi, Madras, Colombo? What do you mean by latitude and longitude?

7. What is the Tropic of Cancer?

# CHAPTER II

## INDIA: PHYSICAL FEATURES

1. **Boundaries of India.**—If we turn to a physical map of Asia, in which the highlands are coloured brown and the lowlands are coloured green, we notice

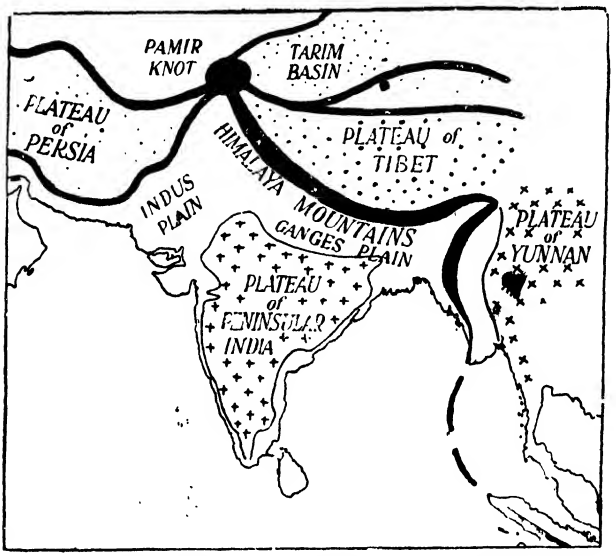



**Fig. 4. Mountains and Plateaus of Southern Asia**

Plateaus of old hard rocks marked by crosses, fold mountains marked in black lines, and younger plateaus by dots.

first of all that India is marked off very clearly from the rest of Asia by a great wall of mountains. In the north-west the mountain wall cuts off India from

Afghanistan, on the north the mountain wall includes the highest mountains in the world and divides India from Tibet. On the east the mountain wall sweeps down and cuts off Burma from India. That is one reason why Burma is very different from India.

India is surrounded, then, on the north-west, the north and east by mountains. On all other sides is the Indian Ocean. India is, as we say, very clearly marked off by its physical features.

2. **Physical Divisions of India.**—If we look again at the atlas and notice what lies within the Mountain Wall, and makes up India, we see there are two large areas of green, which indicates lowland, and a large area of light brown or yellow, which indicates a plateau. From this we learn that India consists of three main parts:—

(*a*) a great mountain wall;

(*b*) a great lowland plain, the plain of northern India or the Indo-Gangetic Plain, formed by the valleys of three great rivers, the Indus, Ganges and Brahmaputra, and their tributaries; and

(*c*) a great plateau, the plateau of Peninsular India.

These three great regions are shown simply in Fig. 4—a little sketch-map to be remembered and drawn from memory.

3. **The Coast Line of India.**—Now let us look for a moment at the sea coast of India. There are few deep bays or gulfs. Look at the position of places in the heart of India—like Delhi or Peshawar or Nagpur. They are all a very long way from the sea. This explains why very many Indians have never seen the sea. Now look at a map of Norway or the British Isles. The coast is very different from that of India. It is very broken up by deep bays, gulfs, river mouths,

etc., and no part of the country is very far from the sea. As a result nearly all English people or Norwegians have seen the sea, most of them like the sea and many of them are sailors. In India it is not so, only the people who live near the sea like it and learn to become sailors. In geography we say that India has an uninterrupted coast line. In India the shape of the coast line has two important effects. There are very few bays or gulfs which can be used as harbours. Out of all the important ports of India only one has a good natural harbour—Bombay. Another (Calcutta) is on a river; two are on inlets which have had to be much improved by dredging (Karachi and Cochin). Although the coast on the east is less rocky than the coast on the west, the sea along the coast is shallow so that the great waves break some distance from the shore. The sea is thus too shallow for large ships to approach the shore whilst the surf makes it dangerous to land in small boats. (Only at Madras and Vizagapatam can steamers come right alongside the wharves.) At Madras and Vizagapatam are artificial harbours made by man. The other important effect is on the character and occupations of the people.

4. **The Mountain Wall.**—The Mountain Wall of India has been given different names in different places. Right away in the far north is a great knot of mountains, over three miles high, known as the Pamir Knot. From here great ranges of mountains run out in all directions. Greatest of them all is the Himalayan Range, branching out in a south-easterly direction and running in a great curve for nearly 2,000 miles. The Himalayan Chain has many of the highest mountains of the world—Mt. Everest, 29,141 feet; Kinchinjunga, 27,815 feet; and many others. Another range which is really a northern branch of the Himalayan Chain runs

eastwards from the Pamir Knot and is called the Karakoram Range. One of its highest peaks is Mount K2 or Mount Godwin Austen (28,250 feet). Farther east this range passes into the Kwen Lun (or Kun Lun) Range.

Westwards from the Pamir Knot into Afghanistan is the Hindu-Kush; south-westwards are the Sulaiman Mountains and the ranges of Baluchistan (the Khirthar Range).

Notice that to the north of the Himalaya Mountains lies the Plateau of Tibet, the highest plateau in the world and so high that it is often called the 'Roof of the World'.

The mountain wall between India and Burma has received various names. In the north, it is a narrow wall and is known as the Patkoi Hills, then it broadens out into the Naga Hills and the Manipur Plateau, sending out a great branch westwards into Assam. This branch forms the Jaintia, Khasi and Garo Hills. Southwards from Manipur are the Lushai Hills and then again a narrow wall known as the Arakan Yoma. The Arakan Yoma reaches the sea at Cape Negrais, but is continued in the Andaman and Nicobar Islands.

5. **The Plain of Northern India.**—Inside the mountain wall and forming a great curve from the Arabian Sea to the Bay of Bengal is one of the most important plains in the world. It occupies the greater part of Northern India and is more than 2,000 miles from end to end and usually from 150 to 200 miles broad. This plain is formed by the basins of three rivers and their tributaries. In the west and draining into the Arabian Sea is the River Indus. Farther east is the River Ganges which flows south-eastwards into the Bay of Bengal. The city of Delhi, the proud capital of India, stands nearly on the water-parting between these two

**Fig. 5. Part of the Mountain Wall of India**

The Kinchinjunga Range seen from Tiger Hill, Darjeeling. Notice the position of the snow line at about 20,000 feet.

river basins. Before the Ganges reaches the sea it is joined by the third of the mighty rivers, the Brahmaputra.

Throughout the whole of the Plain of Northern India there is not a hill to be seen. The floors of the river valleys rise so gradually that the slope cannot be seen. Nearly 1,000 miles from the mouth, the surface of the River Ganges is only 500 feet above sea-level. Delhi, in the heart of India, is only 700 feet above sea-level.

6. **The Plateau.**—Nearly the whole of India south of the great Plain of Northern India is occupied by a plateau or tableland. A tableland is so called because it is raised up above the level of the sea just as a table is raised up above the floor. If a table had two legs shorter than the other two, the surface of the

table would slope from one side to the other. The Plateau of India is like that. The western edge is the higher and the surface usually slopes down towards the east. The western edge of the tableland stands up high above the surface of the sea and is known as the Western Ghats. Notice that the Western Ghats are different from the ranges of mountains in the Mountain Wall. They are really only the western edge of the plateau. In the same way the lower eastern edge has been named the Eastern Ghats. The Eastern Ghats are interrupted by a number of river valleys. The plateau as a whole is higher in the south—in Mysore—than it is in the north. The highest point, Dodabetta, reaches 8,760 feet.

Between the Western Ghats and the sea there is a narrow coastal strip; between the Eastern Ghats and the sea there is a broader coastal plain.

The surface of the plateau is by no means smooth. It has been deeply furrowed by river valleys. Then, towards the north, a line of mountains runs across the plateau from west to east. These mountains are the Satpura Range, continued eastwards as the Mahadeo Hills and Maikal Range. This line is a very important one, for the mountains are not easy to cross and so the range cuts off 'Northern India' from what is properly called 'Peninsular India'. Throughout history this line has been an important barrier. There are two other parallel lines—the Vindhya Range to the north and the Ajanta Range to the south—which have helped to make the line more important.

Northwards from the Satpura line, the plateau slopes down towards the Plain of Northern India. In the north-west interrupting the general slope, is the Aravalli Range.

[*Photo: L. D. Stamp*

**Fig. 6. Part of the plateau of Peninsular India**

Notice the flat surface—often found in the north-west of the plateau. On the right can be seen the abrupt edge (the Ajanta Range) with the river plain of the River Tapti beyond. The famous Ajanta Caves can be seen cut into the sides of the deep gorge.

7. **Doors through the Mountain Wall of India.**—We have spoken of the mountain rampart which surrounds India. There are no easy ways through it, but there are some difficult passes by which people from outside can approach India. In bygone ages, India has been invaded many times from the north-west. The two more important doors by which the invaders came were the Bolan Pass and the Khyber Pass, which are indicated on Fig. 7. These doors are still important: a railway has been constructed through the Khyber Pass as far as the frontier and one through or near the Bolan Pass to Quetta and through Baluchistan. Another route is along the sea coast of Makran. In later chapters reference will be made to the difficult routes through Kashmir to Tibet and of the routes through Darjeeling to Tibet and also the difficult routes

across the mountains from India to Burma. The latter routes are very little used and nearly everyone goes to Burma by sea—from Calcutta or Madras to Rangoon.

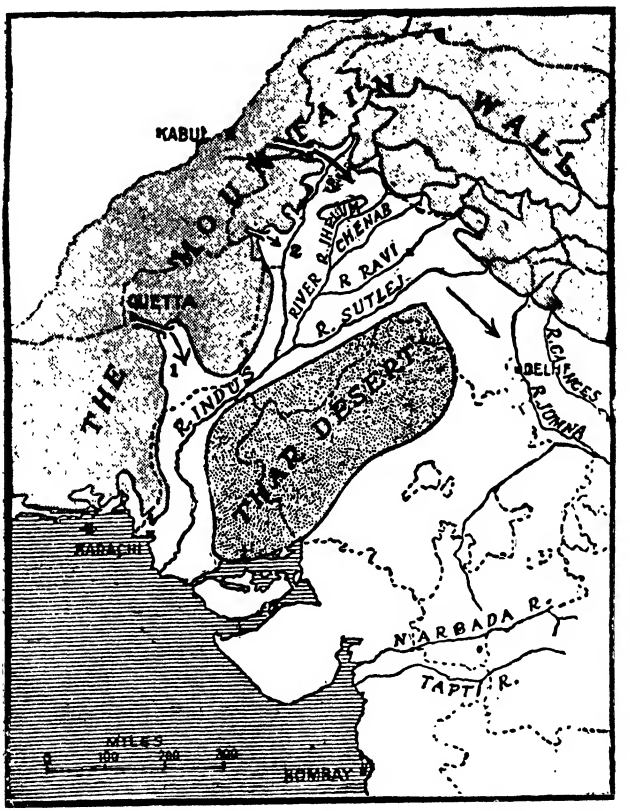



**Fig. 7. Doors of North-Western India**

1, The Bolan Pass; 2, The Gomal Pass; 3, The Khyber Pass; 4, The Makran Coast route.

The large arrow indicates the route by which invaders had to pass Delhi on their way to the east and south of India.

**8. The Rivers of Northern India.**—A careful study of the atlas shows that the great rivers of Northern India all rise in the mountain wall or beyond it. As we shall learn later, it is very cold in those high mountains and the ground is covered with snow for much

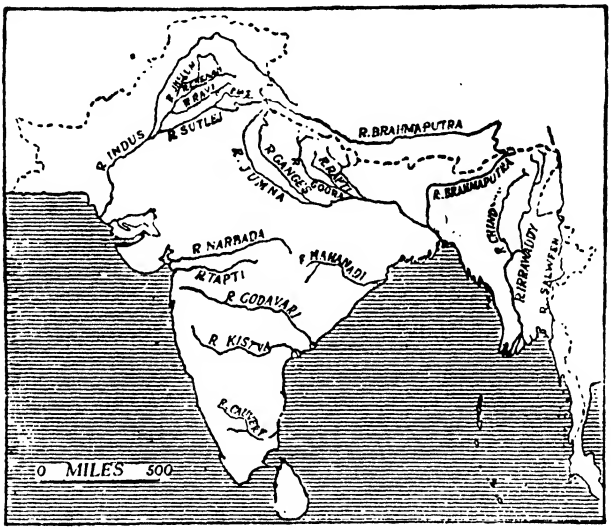



**Fig. 8. The rivers of India**

of the year (see Fig. 5). The rivers are fed with water from the gradual melting of the snow. Thus these rivers do not depend for their water entirely on the monsoon rain; they depend also on the snow and rain which falls in the mountains at other times of the year, so we find these rivers are never dry; they always have some water in them although the quantities vary very much from one season to another.

In the mountains the rivers are roaring, rushing torrents, pouring through gorges, in narrow valleys, over water-falls and amongst great boulders. When

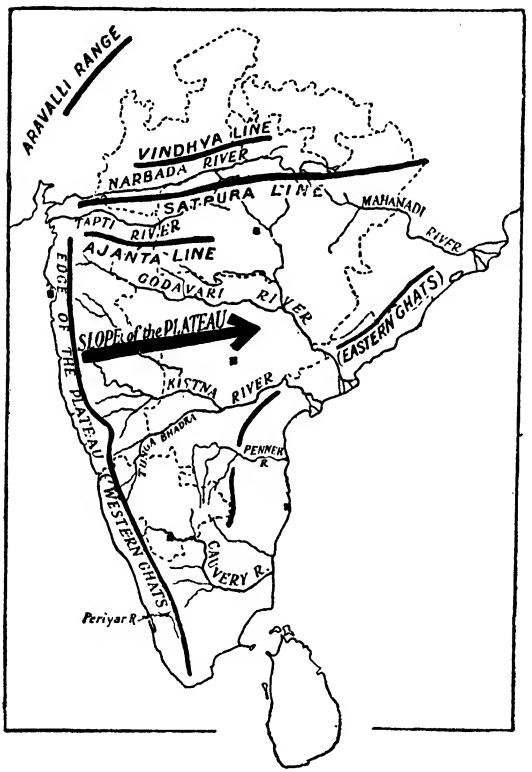



**Fig. 9. Rivers of Peninsular India**

they reach the Plain of Northern India, they become slow, broad rivers wandering lazily across the plain. So flat is the valley that often the rivers desert their bed and make a new course.

The three great river systems of Northern India are:—

(*a*) The Indus River, with its tributaries the Jhelum, Chenab, Ravi, Bias and Sutlej (the five rivers of the Punjab). See Fig. 8.

(*b*) The Ganges River, with its tributaries the Jumna, Gogra, Rapti and Gandak all rising in the Himalayas and its tributary the Son rising in the plateau.

(*c*) The Brahmaputra River, which has no important tributaries.

9. **The Rivers of Peninsular India.**—The rivers of Peninsular India are quite different from the rivers of Northern India. They rise in the hills of the Plateau and they are fed only by the monsoon rains. In the Dry Season they often become almost dry; so nearly dry that only the smallest boats can use them. In paragraph 6, we said that the plateau of India slopes from west to east. If you poured water on a table top which sloped from one side to the other, of course it would run down the slope. So the monsoon rains which fall on the plateau run down the slope, from the Western Ghats to the Bay of Bengal. The most important rivers flowing to the east are the Mahanadi, Godavari, Kistna and Cauvery. Fig. 9 illustrates this.

We spoke above of the Vindhya, Satpura and Ajanta Ranges which run across the north of the Plateau from west to east. Between these ranges we find two important rivers—the Narbada (the old spelling is Nerbudda) and the Tapti, both flowing westwards.

10. **The Rivers of Baluchistan and Tibet.**—Both Baluchistan and Tibet are very dry countries. The rivers only flow after rain, and, strange to say, they never reach the sea. They flow instead into shallow lakes which often dry up in the Hot Season.

11. **Contours.**—We have been talking a great deal in this chapter about height above sea-level. We must have some way of showing on a map the height of the land above the level of the sea. For this purpose we use contours or 'contour lines'. A contour is a line passing through all places which are at the same height

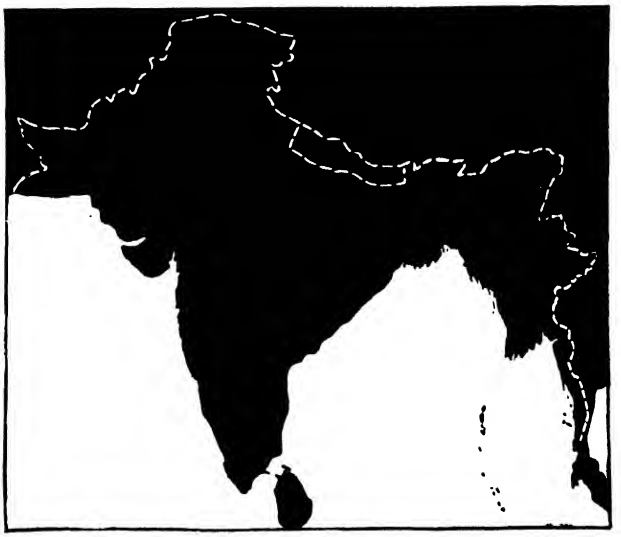


**Fig. 10. India, Burma and Ceylon as they are, all land black**

above sea-level. If we try to imagine that a great earthquake occurred in India and that the land sank 1,000 feet, the sea would flow over all the lowland and the only parts of India remaining above sea-level would be those parts which are more than 1,000 feet above the present sea. In other words the sea would cover the country up to the 1,000 feet contour line.

Similarly we have contour lines for 2,000, 3,000, 4,000 feet, etc., or for any intermediate heights. If

**Fig. 11. India, Burma and Ceylon as they would look if the sea rose 1,000 feet**

we walk along a contour line we are always exactly at the same height above sea-level and our walk cannot take us up and down hill. Why do two contour lines never cross one another?

Now look at Figs. 10 to 12. Fig. 10 shows India as it is—all land black. Fig. 11 shows India as it would look if the sea rose 1,000 feet, or the land sank 1,000 feet. In Fig. 12 you see the present outline of the country, the land above 1,000 feet (compare Fig. 11) is dotted, whilst the land above 3,000 feet is in black. In other words Fig. 12 is a simple contour or physical map of India in which the 1,000 and

3,000 feet contours are marked. In your atlas the contour maps are made much clearer by the use of

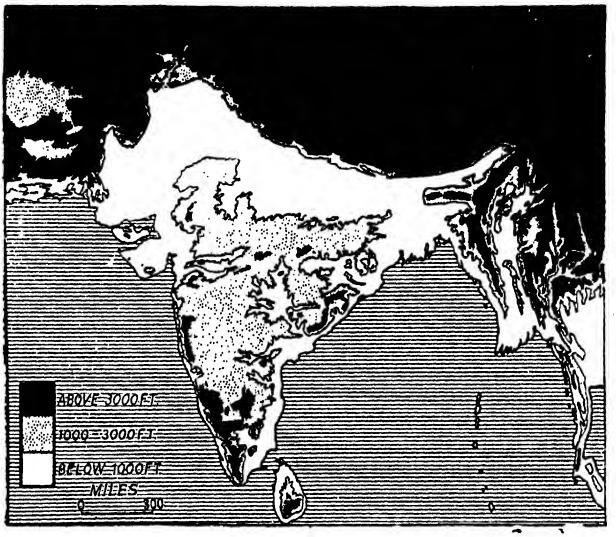



**Fig. 12. Contour or physical map of India**

colour; the lowlands are coloured green, the highlands brown, etc.

## QUESTIONS AND EXERCISES

1. Draw a sketch-map (from memory) showing the principal mountain ranges of India.

2. Divide India into physical regions; use sketch-maps in your answer.

3. Describe the Basin of the Ganges.

4. Explain fully why contour lines cannot cross one another.

5. If a person entered India from the north-west on foot, show by sketch-maps the easiest way to Burma and to the south of India. Show clearly the physical features (mountain ranges, etc.).

6. If the sea rose 3,000 feet, what parts of India would remain above sea-level?

# CHAPTER III

## GEOLOGY AND USEFUL MINERALS OF INDIA

1. **Geology.**—Geology is the science which tells us about the earth's crust and its structure. Geography tells us about the surface of the earth but geology goes deeper and deals with the crust itself and the changes which take place in it as well as on its surface.

Our knowledge about the inside of the earth is still limited. We know that it is very heavy and is probably a solid mass of iron. Outside this iron core is a layer which is very, very hot—so hot that the rocks are almost molten or liquid—and then outside this layer comes the solid earth's crust on which we live. Some parts of the crust stand out above the others and form the land; the lower parts are covered with water and form the oceans and seas.

2. We must have some name for the materials which make up the crust. The geologist calls them all 'rocks'.

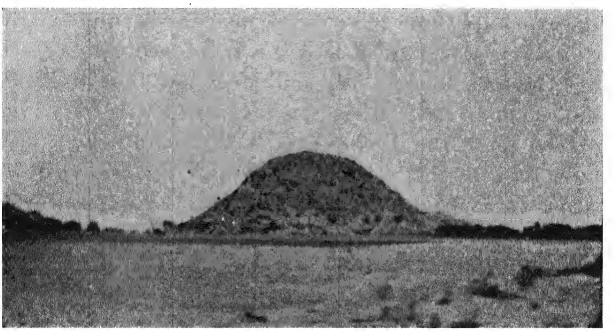
**Rocks.**—There are rocks of all kinds, some are soft and some are hard. When we look at the surface of the earth perhaps we think it never changes. We even talk about the 'everlasting hills'. Geology teaches us, however, that changes are gradually but continuously going on. The mountains are being worn away and the seas being filled up. Some rocks are being destroyed and others being formed. Thus we find that rocks are not all of the same age, some are younger than others. Every year the great rivers like the Ganges and the Irrawaddy are bringing down mud and

dropping it near their mouths, so that the mud or 'alluvium' which makes up the deltas of the rivers is both a very young rock and a very soft one. As a rule the older the rock the harder it becomes. The layers of mud, sand and stones which are laid down by rivers in the sea or in lakes as well as sand and dust which are blown from one place to another by the wind all belong to one class of rocks—the Sedimentary Rocks. They all consist of little pieces of older rocks which have been broken off and carried to another place to be laid down as 'sediments'.

3. **Igneous Rocks.**—We said just now that below the solid earth's crust there is a layer which is very, very hot, so that the rocks are sometimes melted. We know that it gets hotter and hotter as we go downwards, for when a man goes down a deep mine he finds the air and rocks around him getting hotter and hotter. In some parts of the world there are holes or cracks through which the molten rock can come out. We call these holes or cracks volcanoes. The molten rock which comes up is called 'lava'. It is red-hot when it is first poured out, and takes a long time to cool. Sometimes one volcano is found all alone, at other times there are numbers of them close together in a line. There are now no volcanoes in India. There used to be a big solitary one in Central Burma, but now it is dead, or as we say, 'extinct'. This volcano is Mount Popa. The lava which it has poured out has built up a mountain 5,000 feet high. Then a large part of the Indian Plateau is covered with lava which was poured out ages ago from a number of long cracks in the earth's crust and spread out in flat sheets. Some of these sheets can be seen in Fig. 6. All these rocks which have been molten but which became solid on cooling are called Igneous Rocks. There are others

which were once molten but never reached the surface of the earth. Instead they solidified slowly underground but have since been exposed by the removal of the rocks at the surface by rivers, etc. The most important of such rocks is granite, seen in many parts of the Plateau of Peninsular India.

4. **Metamorphic or Crystalline Rocks.**—When the sedimentary rocks have been made very hot by being



[*Photo: L. D. Stamp*

**Fig. 13. A hill on the plateau in Hyderabad built up of granite**

Notice the way in which it weathers into large boulders.

near the big masses of molten rock, or by being buried deep in the crust, they have become quite changed and are called Metamorphic or Crystalline Rocks. They are usually very hard and consist of shining pieces or crystals of different minerals. Such rocks make up most of the Plateau and Ceylon.

5. **Earthquakes.**—Have you ever felt an earthquake? If you have you know that the earth suddenly begins to shake. That tells you that the crust of the earth is not perfectly still. As a result of the molten igneous

rocks moving in the lower parts of the crust, the surface of the earth is not steady. Sometimes very large earthquakes occur and the rocks become folded or bent. In the course of long ages, small earthquakes and big earthquakes cause some parts of the earth's crust to rise up and form mountains whilst other parts are pressed down. Also the movements fold the rocks just as you can fold your exercise book if you lay it out on the desk and then press it from either side. In this way big wrinkles are formed on the crust of the earth, just as you can see wrinkles on the skin of some mangoes. When sedimentary rocks are folded in this way they are compressed and made hard. The wrinkles form the lines of mountains of hard rocks and we call such mountains 'folded mountains'. Now you can understand why some parts of the country are built up of hard rocks whilst other parts consist of soft rocks easily worn away.

6. **Denudation.**—As soon as mountains and dry land are formed they commence, very gradually, to be worn away. The rain falls down and washes away the soft pieces; the sun dries up the rocks, makes them very hot and cracks them; the wind blows away the fine dust and sand. On cold mountain tops, the water in the cracks of the rocks becomes frozen and because water expands or gets larger when it freezes, pieces of rock are split off. All this is the work of the weather and we call it 'weathering'. Some rocks are gradually dissolved by water, others are broken up by the roots of plants. On the sea coast the waves dash against the coast and wear it away. All these processes of wearing away the rocks are called 'denudation'. The word 'denudation' means laying bare, because these processes lay bare the rocks underneath.

7. **The Work of Rivers.**—When the rain falls on the earth, part of it runs along the surface and collects together to form a small stream. The stream cuts for itself a little valley and washes away sand and stones, it joins other streams and forms a river. In the mountains, where the rivers are full of rushing water, deep V-shaped valleys are cut out, the river rolls along great boulders and stones as well as sand and mud. When the river reaches lower ground it becomes slower and its chief work is to carry along sand and mud. Have you ever watched one of the great rivers of India such as the Ganges or the Godavari and noticed how muddy the water is? That mud has been brought from the distant mountains. Near the mouth the river becomes still slower and begins to drop its load of sand and mud and so builds up its delta. The material dropped by a river in this way is called *alluvium*. We can, then, divide a river's course into three parts—

(*a*) the upper course where its work is denudation or wearing away the land;

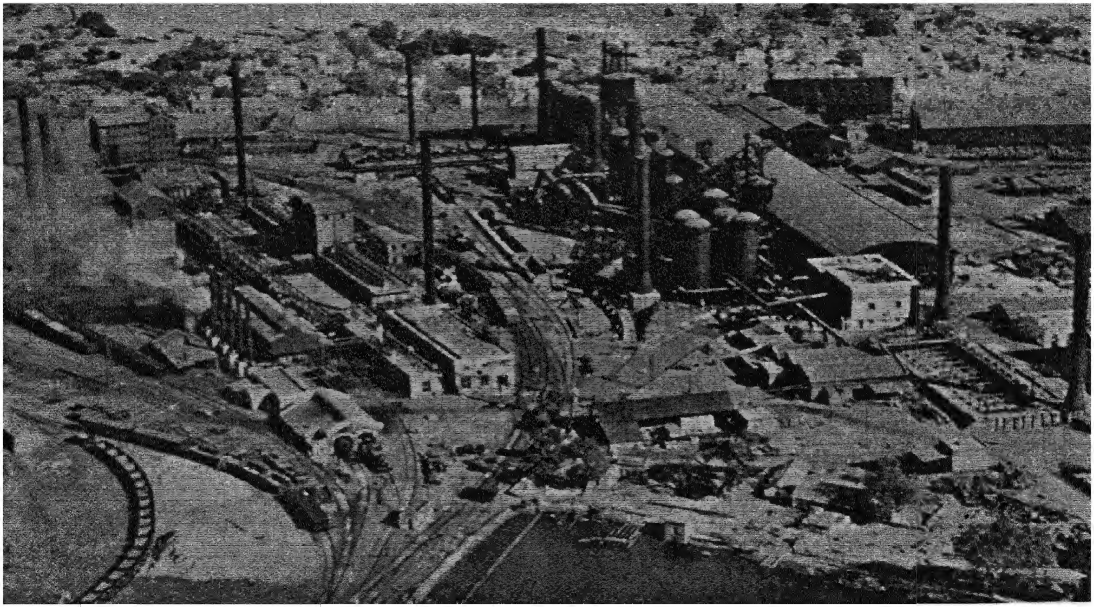
(*b*) the middle course where its work is transportation or carrying of material; and

(*c*) the lower course where its work is deposition or building up the land.

8. **Valleys.**—Most valleys are cut out by rivers. At first the valley is V-shaped and narrow but gradually rain and smaller streams wear away its sides and it becomes broader. Then water does not flow straight but swings from side to side, so the river flows in curves or 'meanders', and the valley is widened still more until it becomes a valley plain. The river may deposit alluvium over its valley so that the valley becomes still flatter. Of course the soft rocks are worn away much more easily than hard rocks and

while the valley amongst the hard rocks often remains deep and narrow, the soft rocks are soon worn away to form a plain.

9. **The Geology of India.**—The main features of the geology of India are very simple and fit in very well with the physical features. Study Fig. 15 carefully. The great mountain walls consist mainly of folded sedimentary rocks: they are 'fold mountains'. The Indo-Gangetic Plain of Northern India consists almost entirely of alluvium, and so do the coastal plains and of course the river deltas. The alluvium of the Ganges Valley is very thick—many hundreds of feet. In the Upper Ganges Valley and in the Punjab, there are hard pieces in the soft alluvium, called Kankar. The Indian Plateau and the Shan Plateau in Burma, as well as the Island of Ceylon (which is really a part of the Indian Plateau, cut off from the mainland) consist mainly of metamorphic or crystalline rocks together with some granites, other igneous rocks and sandstones. We said in the last chapter that the Western Ghats are really the edge of the plateau and different from the mountains of Northern India. Geologically they are quite different too. The whole Plateau is a great mass of very, very old crystalline rocks forced up bodily by earthquake movements. This old block was in existence long before the great Himalayan fold mountains were formed. Round the edge of the plateau and occupying hollows on its surface are some old sedimentary rocks. These basins or troughs are sometimes important because they include coal seams. Coal represents the remains of former forests. Also on the plateau covering a large part of its surface in the north-west are enormous sheets of lava—the Deccan Lavas. This is one of the largest areas of lava in the world.



[*Photo: Indian Air Survey Co. Ltd*

**Fig. 14. A general view from the air of India's great Iron and Steel Works**

10. **Useful Minerals.**—Like the igneous rocks, the valuable ores of gold, silver, tin, copper, lead, zinc, and sometimes iron, have usually come up in a molten form from the heated lower layers of the earth's crust. As a result we nearly always find these valuable ores together with the igneous rocks, or in cracks amongst the old crystalline rocks. Look again at Fig. 15 and notice those areas where the valuable ores are likely to be mined. Precious stones and gems also are found with the crystalline rocks. We noted earlier in this chapter how even the hard rocks may be worn away and the pieces carried away. The valuable ores may be carried away like this and sometimes we find 'alluvial deposits' such as alluvial gold, where the gold has been washed out of the old rocks and deposited again as fine dust in the beds of streams or in the alluvium of great rivers.

Amongst the metals obtained from ores in the old rocks the most valuable is gold. This is now entirely from the Kolar Goldfield in Mysore. Manganese, which is used for mixing with iron to make hard steel, is found in many places in the old rocks but especially in the Central Provinces, Madras, Bihar and Orissa. Chromite (chromium ore) is used for similar purposes and is obtained from the old rocks in Madras, Mysore and Bihar. Copper comes from Singhbhum in Bihar. Especially interesting is iron ore. For hundreds of years iron ore has been worked in many parts of India as a 'village industry' and smelted with charcoal obtained from the forests. But India has now large modern iron and steel works. The iron ore comes from Bihar and the chief works are at Tatanagar and Jamshedpur near the coalfield. There are also works in Mysore.

Another mineral from the old rocks is mica which

is transparent like glass but is very difficult to melt so that it is used to make windows for furnaces.

Two important minerals which always occur in the sedimentary rocks are coal and oil. Both of them have really been formed from vegetation—plants which grew in past ages, and perhaps animals which have

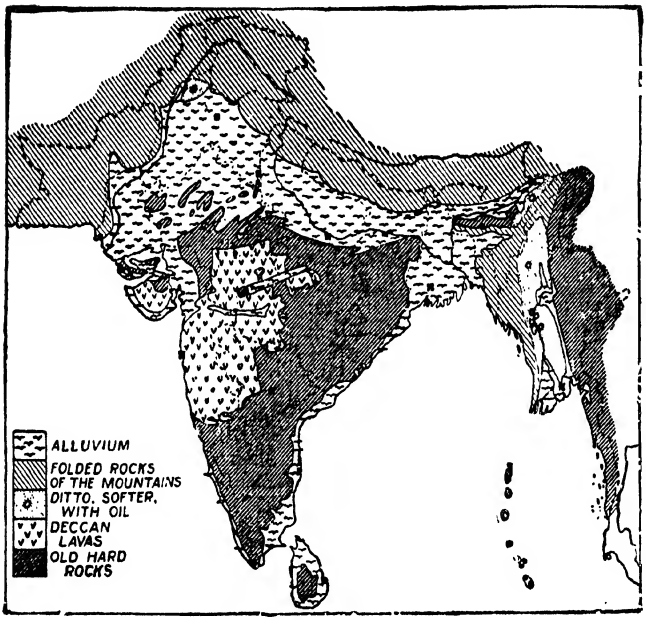


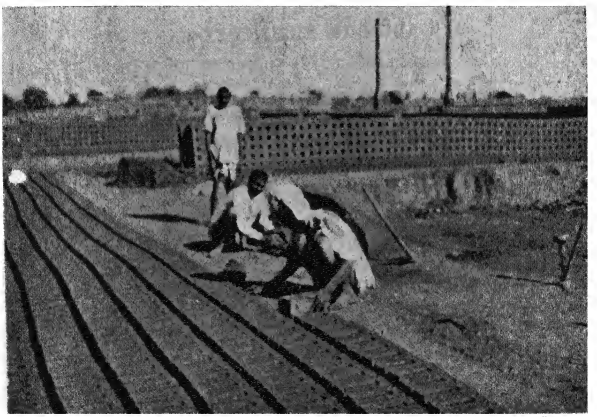

**Fig. 15. Geological map of India**

*Note.*—In Ceylon the lowlands are marked as 'alluvium'. In the north they are really soft limestones and sands, in the other parts they are old hard rocks hidden by laterite.

been buried by masses of river sediments and have become changed into coal or oil. Oil occurs in the newer sedimentary rocks, but the best coal in the older

sedimentary rocks. We do not find oil in rocks which have been very much folded, because there the oil would be squeezed out. So the oil fields are on the edges of the great fold mountains (see Fig. 15)—in the Punjab (near Attock) and Assam (at Digboi and other places). Far more important are the great oil fields of Burma (see Chapter XLIII).

The chief coal-field in India lies on the edge of the Chota-Nagpur Plateau, in the north-eastern corner of



[*Photo: L. D. Stamp*

**Fig. 16. The Brick-making industry near Delhi**

Notice the workman who has made a soft ball of alluvial clay by mixing it with water. The workman next to him is squeezing it in a mould and the mud bricks are laid out to dry in the sun. Later they will be put into the 'kilns' in the background and strongly heated.

Peninsular India. Here nine-tenths of all the coal of India is obtained—nearly 20,000,000 tons a year in the Jharia and Raniganj Fields. There are also coal seams in the Godavari Valley and at Daltonganj in Bihar. Another mineral found in sedimentary rocks

is salt (found in the Salt Range of the Punjab) but much is obtained from the sea. The sea-water is run into shallow 'pans' and then allowed to evaporate so that the salt is left behind.

Then we must not forget the building stones and road stones quarried in many parts of India, as well as the lime and cement made by burning limestone. More and more buildings in India are being strongly built of brick and the making of bricks is now a big industry near such towns as New Delhi.

### QUESTIONS AND EXERCISES

1. Make a collection of all the different kinds of rock you can find and bring the collection to school.
2. What is alluvium and how is it formed?
3. Why would you not expect to find oil and copper in the same place?
4. Describe the working of a volcano.
5. Write an account of denudation as you see it near your home.
6. How are the earthquakes caused, and what effect do they have on the earth's crust?

# CHAPTER IV

## CLIMATE (TEMPERATURE)

1. **The Atmosphere or Air.**—Surrounding the earth like a blanket is the air or atmosphere. We cannot see it and so perhaps we may find it difficult to believe that it exists. But we can feel it when it is moving (as wind). If we move our hand backwards and forwards quickly we feel the rush of air against it. The air is a mixture of gases. One of these is oxygen and without oxygen we could not live. When we breathe we take the oxygen into our bodies. There is also a very little of another gas in the atmosphere, called carbon dioxide which is breathed out by man and animals but which is used by plants. When things burn they use oxygen, and carbon dioxide is given off. But more than three-quarters of the air consists of nitrogen which is not used either by plants or animals.

Air has weight and the top layers of air press down on the lower layers, so that the pressure is greatest when we are on low ground or on the sea and have the whole weight of the air above us.

2. **Temperature.**—Temperature means the amount of heat or cold. On some days we feel hot, that is the air is hot and makes us feel hot. Another way of saying the air is hot is to say the temperature of the air is high. When it is cold we say the temperature is low. Thus the air can be hot or cold or, as we say, its temperature varies.

The air receives its heat from the sun. We know how warm we get by sitting in the sun. The rays

of heat come from the sun and strike on our bodies and make us feel hot.

The air is warmed by the sun in two ways. The rays of heat come from the sun, pass through the air and make it warm. The rays also strike the land and make it hot and then the air which is touching the land gets hot also. So we find that the lowest layers of the air being in contact with the land are hotter than the upper layers.

We can now understand why countries near the equator are hotter than countries near the poles. Look at Fig. 17. Notice that the sun's rays shine almost

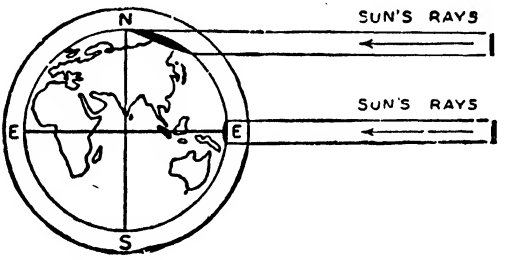



**Fig. 17. Diagram showing that at the poles the sun's rays are spread out over a large area and cannot make the earth so warm as in the Tropics**

vertically on countries near the equator but come down very obliquely on countries near the poles. That is, a certain number of heat rays from the sun are spread over a small area near the equator but the same number pass through a greater thickness of air and are spread over a much larger area of ground near the poles.

3. **Thermometers.**—The word 'thermometer' comes from two Greek words and means 'heat measurer'. It is easy to say that it is 'hot' or it is 'cold' but

two people do not always agree whether a day is 'hot' or 'very hot'. We must have a more accurate way of measuring temperature and so we use thermometers. A thermometer consists of a glass tube with a bulb at one end and closed at the other. The bulb and part of the stem is filled with a liquid, usually mercury or alcohol. Now most things when they are heated get larger or 'expand'. Some substances, like glass and wood, only expand very slightly whilst others like mercury or alcohol expand very much. Now you will see what happens to the thermometer when the temperature increases. The mercury or alcohol expands much more than the glass tube and so the column of mercury or alcohol rises.

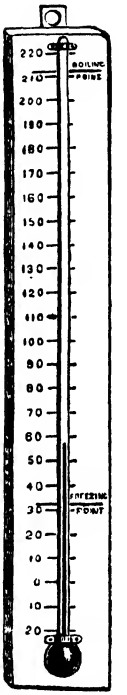



**Fig. 18. A Fahrenheit Thermometer**

4. **Thermometer Scales.**—We can make our thermometer very hot indeed by putting it into boiling water. The mercury will then rise very high in the tube and we can make a mark on the tube showing the height to which the mercury has risen. Then we can make our thermometer very cold by putting it into ice which is just melting and mark the level of the mercury in the same way. We now have two very important marks on our thermometer, one is 'Boiling Point' or the temperature of boiling water; the other is 'Freezing Point' or the temperature of melting ice. We can mount our thermometer on a piece of wood and put the marks on the wood. Look at Fig. 18 where this

has been done. You will see 'Boiling Point' and 'Freezing Point' marked on the wood. There was once a famous scientist named Fahrenheit, who said that it would be much simpler if he called these points by numbers. So he called Freezing Point 32 degrees (written 32°) and Boiling Point he called 212 degrees. Between these two points he made 212 − 32 = 180 little divisions. We call this the Fahrenheit scale and a thermometer marked as the one in Fig. 18 is called a Fahrenheit thermometer. That is the thermometer we shall use in this book.

There are also other 'scales' or ways of marking a thermometer. One of the most important is the Centigrade scale. Here Freezing Point is called 0° and Boiling Point 100° and there are 100 divisions or degrees between the two.

5. **Maximum and Minimum Thermometers.**—Have you ever woke up in the middle of the night and noticed

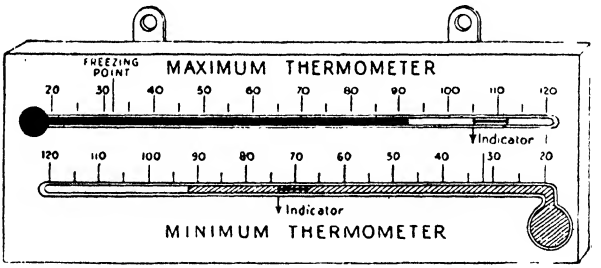



**Fig. 19. Picture of Maximum and Minimum Thermometers at Lahore**

how cold it has become? By the time you get up in the morning perhaps it is much warmer again. If you look at a thermometer it tells you the temperature just at that moment when you are looking at it. If

it gets warmer it will go up, if it gets colder it will go down. If you wanted to know which was the hottest part of the day and which was the coldest you would have to sit watching the thermometer all day long. Yet it is very important for us to know the highest and lowest temperatures reached during the day since half way between these two figures will be the average temperature for the day. In order that we should not have to watch the thermometers all day and all night we have two special kinds of thermometers. One is called a 'Maximum Thermometer' and records the maximum or highest temperature reached during the day; the other is called a 'Minimum Thermometer' and records the minimum or lowest temperature of the day. In Fig. 19 is a picture of the two thermometers mounted on one piece of wood. Look first at the Maximum Thermometer. It is filled with mercury. Inside the tube is a little glass or metal rod or 'Indicator'. As the temperature increases and the mercury rises this little indicator is pushed by the mercury further and further along the tube. When the temperature drops again and the mercury falls, the little indicator is left behind and so shows us the highest temperature reached. The Minimum Thermometer is filled with alcohol. Here also there is a little glass indicator but this time it is inside the column of alcohol. As the temperature falls and the alcohol drops it drags the little indicator back with it. But when it rises, the alcohol flows past the indicator and does not move it. So the indicator marks the lowest temperature reached. When we have noted the highest and lowest temperatures, we can shake the indicators back to their first position. Fig. 19 has been drawn very simply so that you can easily compare the two thermometers; usually the

thermometers are mounted with their bulbs away from one another. One shake then sends both indicators to their proper position.

6. **Regarding Temperatures.**—Throughout India there are stations where the temperature is carefully

| 1937 | Temperature | | | Rainfall in inches |
|---|---|---|---|---|
| | Maximum | Minimum | Mean | |
| October | | | | |
| 1 | 86·5 | 79·9 | 83·2 | 0·23 |
| 2 | 86·8 | 80·0 | 83·4 | 0·12 |
| 3 | 87·9 | 79·8 | 83·9 | 0·05 |
| 4 | 86·4 | 79·4 | 82·9 | 0·07 |
| 5 | 85·2 | 79·0 | 82·1 | 0·02 |
| 6 | 86·9 | 78·2 | 82·6 | 1·48 |
| 7 | 86·7 | 80·0 | 83·4 | 0·21 |
| 8 | 87·1 | 79·3 | 83·2 | 0·29 |
| 9 | 88·0 | 79·8 | 83·9 | 0·74 |
| 10 | 82·0 | 78·3 | 80·2 | 0·18 |
| 11 | 86·3 | 80·0 | 83·2 | ... |
| 12 | 87·9 | 78·0 | 83·0 | 0·00 |
| 13 | 88·0 | 82·1 | 85·1 | 0·30 |
| 14 | 86·1 | 80·0 | 83·1 | 0·12 |
| 15 | 84·2 | 78·1 | 81·2 | 0·31 |
| 16 | 79·5 | 77·1 | 78·3 | 1·20 |
| 17 | 82·3 | 75·4 | 78·9 | 0·05 |
| 18 | 83·4 | 73·3 | 78·4 | ... |
| 19 | 85·2 | 78·2 | 81·7 | ... |
| 20 | 86·0 | 78·2 | 82·1 | ... |
| 21 | 86·9 | 79·1 | 83·0 | ... |
| 22 | 87·5 | 78·0 | 82·8 | ... |
| 23 | 86·8 | 78·4 | 82·6 | ... |
| 24 | 85·6 | 78·8 | 82·2 | ... |
| 25 | 85·4 | 79·1 | 82·3 | ... |
| 26 | 85·4 | 76·6 | 81·0 | ... |
| 27 | 86·4 | 78·9 | 82·7 | ... |
| 28 | 87·5 | 78·8 | 83·2 | 0·07 |
| 29 | 86·8 | 78·0 | 82·4 | ... |
| 30 | 85·2 | 78·6 | 81·9 | ... |
| 31 | 85·8 | 78·8 | 82·3 | ... |
| | 31)2661·7 | 31)2437·2 | 31)2550·2 | 5·44 |
| | 85·9 | 78·6 | 82·3 | |

recorded day by day. It is usually the duty of all Government Hospitals to keep these records. Here is a page from a Record Book. The observations should be taken at the same time every day: usually at seven o'clock in the morning. The thermometers are hung up about five feet from the ground and in the shade—away from the sun. Notice that for each day of the month the maximum and the minimum temperatures are recorded. If we add these two figures together and divide by two we get the average temperatures for the day.

7. **Average Temperatures.**—Look again at the table above. The month of October has 31 days. If we add up the figures in column 4, that is, the average daily temperatures, and divide by 31 (the number of days in the month) we get what we call the average or mean temperature for the month of October, 1937. In the same way if we add up the figures in column 2 and divide by 31, we get the mean maximum temperature for the month. In the same way adding up column 3 and dividing by 31, we get the mean minimum temperature.

Before we leave this subject we will make a note of a very common mistake. There cannot be such a thing as a 'Total Temperature' for the month. If the figures in any of the columns in the table above are added up, the total means nothing until it is divided by the number of days. Just think about this for a little while. The thermometer is continually moving up and down and there cannot be a total amount of heat for the month or year. It is quite different in the case of rainfall, which will be described in a later chapter.

8. **Monthly Averages.**—In the last paragraph we learnt how to find the average temperature of the

month of October, 1937. But the October of this year might be warmer or colder on the whole than in previous years. So we take the records of a number of years, as in the above table. If we add up and divide

| Year | Mean Monthly Temp. | Monthly Rainfall |
|---|---|---|
| October 1926 | 82·7 | 10·17 |
| ,, 1927 | 81·8 | 4·95 |
| ,, 1928 | 82·2 | 8·25 |
| ,, 1929 | 82·3 | 8·73 |
| ,, 1930 | 81·6 | 10·01 |
| ,, 1931 | 82·5 | 6·42 |
| ,, 1932 | 80·5 | 5·36 |
| ,, 1933 | 81·9 | 3·45 |
| ,, 1934 | 81·2 | 5·10 |
| ,, 1935 | 79·9 | 9·21 |
| ,, 1936 | 80·4 | 6·76 |
| ,, 1937 | 82·2 | 5·44 |
| | 12)979·2 | 12)8·388 |
| | 81·6° | 6·99 in. |

by the number of years we get the average October temperature for this place.

The bottom figure in column 2, 81·6°F., is the normal monthly temperature of October, and is based on the average for twelve years, 1926 to 1937. The bottom figure in column 3, 6·99 inches, is the normal monthly rainfall of October, based on the average for the same twelve years.

In the same way we can get the average temperature for each month of the year. If we talk about the November temperature of a place, that is what we mean: the average temperature during November for a number of years. Two of the most important months to study are January (usually the coldest month in India) and July (six months later and one of the hottest months).

9. **January Temperature in India.**—Now let us compare the January temperature of a number of places in India. At this season of the year the sun is shining vertically over countries south of the equator. We have learnt that India is north of the equator. The sun, then, is shining vertically over places a long way south of India. From what we said in paragraph 2 of this chapter we should expect India to be cool at this season and we should expect the north of India to be colder than the south. One more point, we have learnt that the higher one goes up in the air the colder it becomes. So we should expect places in the hills and mountains to be colder than places on the plains. Let us see if this is actually the case.

| Place | Average temperature in January |
|---|---|
| Colombo (Ceylon) ... | ... 80·0 |
| Madras ... | ... 76·1 |
| Rangoon (Burma) ... | ... 76·7 |
| Bombay ... | ... 75·2 |
| Mandalay (Burma) ... | ... 70·5 |
| Calcutta ... | ... 66·4 |
| Delhi ... | ... 58·8 |
| Lahore ... | ... 54·7 |
| Simla (7,000 feet high) | ... 40·4 |
| Srinagar (6,000 feet high) | ... 33·5 |
| Ootacamund (7,000 feet high) | ... 54·0 |

We see that it is so. Now there are very many more places than these where temperature records are kept. So we can draw a map of India marking against each place the January temperature. We can make our map clearer by using different kinds of shading. This has been done in Fig. 20 which is a temperature map of India for the month of January. You will see at once the coldest places are in the north and the mountains, the warmest places are the plains in the south.

10. **July Temperature in India.**—Now let us see what happens in July. At this season of the year the sun is shining vertically over lands north of the equator,

that is, over the northern part of India. We should expect India at this season to be a very hot country

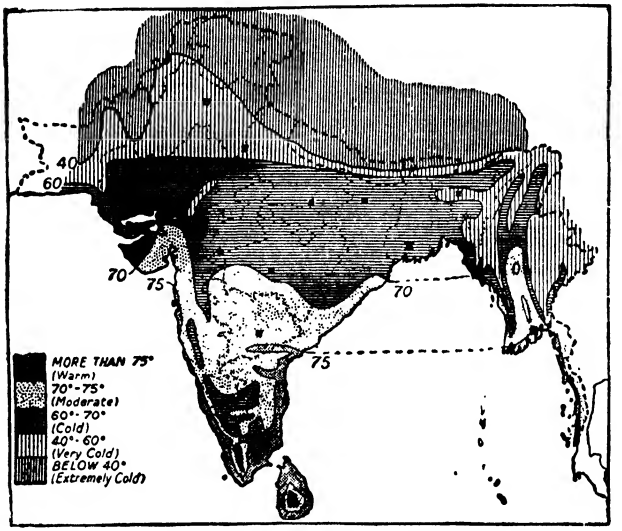



**Fig. 20. Temperature map of India for January**

and should expect the north to be hotter than the south. We find that such is the case, and again places in the mountains are colder than places on the plains.

| Place | Average temperature in July |
|---|---|
| Colombo ... ... ... ... ... | 85·0 |
| Madras ... ... ... ... ... | 87·3 |
| Rangoon ... ... ... ... ... | 80·6 |
| Bombay ... ... ... ... ... | 81·1 |
| Mandalay ... ... ... ... ... | 86·7 |
| Calcutta ... ... ... ... ... | 78·6 |
| Delhi ... ... ... ... ... | 80·9 |
| Lahore ... ... ... ... ... | 90·3 |
| Simla ... ... ... ... ... | 64·5 |
| Srinagar ... ... ... ... ... | 74·5 |
| Ootacamund ... ... ... ... ... | 56·9 |

In Fig. 21 we have drawn a temperature map of India for July. Although, on the whole, the north is

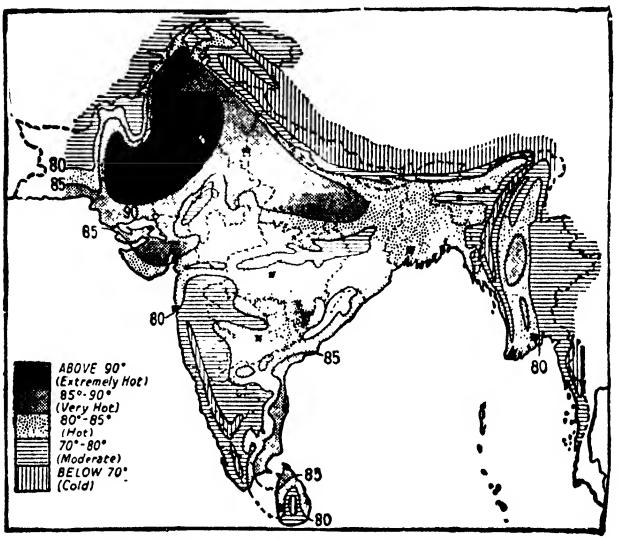



**Fig. 21. Temperature map of India for July**

In the east of Peninsular India there is a small area left unshaded. What should the shading be and why?

hotter than the south, we find the map is not so regular as the January map. That is largely because of two reasons. Firstly land gets hot much more quickly than water and so level plains like the Punjab far from the sea are hotter than places near the sea. Secondly where there are many clouds and much rain, the full force of the sun does not strike the ground and the heat is less. Very dry regions like the Punjab and Central Burma thus tend to be hottest.

11. **Daily Range of Temperature.**—You all know that it is hotter during the day than it is at night. In some

places the difference is only small, in others it is very great. The difference between the highest and lowest temperature reached during the day is called the daily range of temperature. Look back at Fig. 19 which is a picture of the maximum and minimum thermometers as seen by an observer at Lahore. Notice that the maximum thermometer there has been up to 105° and the minimum down to 73°. The difference, or Daily Range of Temperature is 105 − 73 or 32°. This is a very big 'Daily Range'. Now look at Fig. 22. This is a picture of thermometers at Bombay. The daily range shown is 90 − 81, or only 9°. This is a very small difference. The reason for this you will learn in the next chapter.

12. **Annual Range of Temperature.**—You have learnt how to find the average temperature for each month.

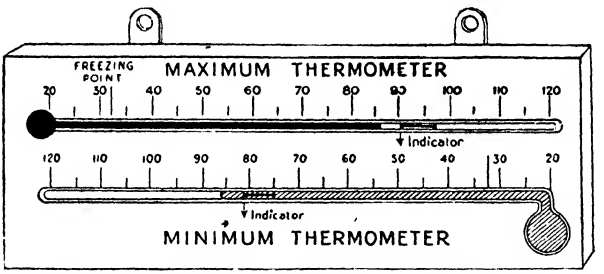



**Fig. 22. Picture of Maximum and Minimum Thermometers at Bombay**

Now let us see how the average temperature varies from month to month. Fig. 23 shows you by little pictures the average temperature in Lahore for each month of the year. You will see that June is the hottest month and January the coldest month. You will also see that in June the thermometer reads 39 degrees (= 93° − 54°) more than it does in January. That

is, in June in Lahore, there are, on an average, 39 degrees more heat than in January. Fig. 24 shows the temperature in Karachi for each month of the year. Again the hottest month is June and the coldest January, but the difference is only 22 degrees.

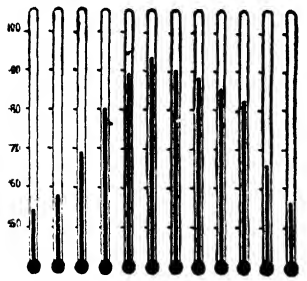


Fig. 23. Diagram of Lahore temperature

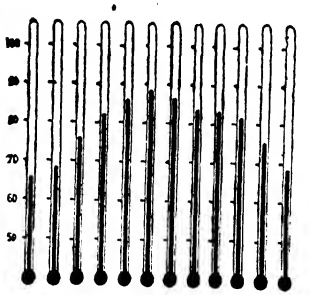


Fig. 24. Diagram of Karachi temperature

The difference between the hottest and coldest month is called the 'Yearly or Annual Range of Temperature'. In Fig. 25 (Bombay) the range is only 10°.

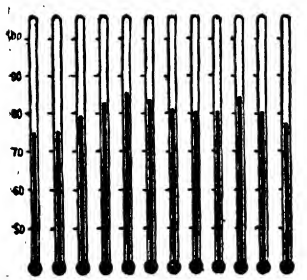


Fig. 25. Diagram of Bombay temperature

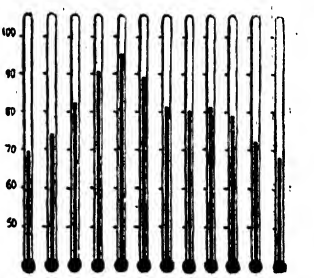


Fig. 26. Diagram of Nagpur temperature

In Fig. 26 (Nagpur) the range is 27½°. In Fig. 27 (Madras) the range is 14°. In Fig. 28 (Trivandrum) the range is only 5°; in Calcutta (Fig. 29) it is 20°.

Notice in each case that the hottest month is not always the same. What can we learn from these figures?

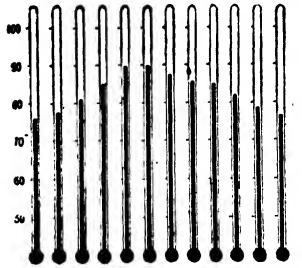


Fig. 27. Diagram of Madras temperature

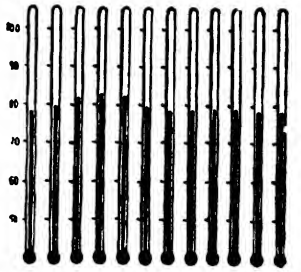


Fig. 28. Diagram of Trivandrum temperature

We learn that the greatest range is found in places on the plains far from the sea, the least range is found in damp places near the sea and near the equator. The reason is the same as that which we noted in the

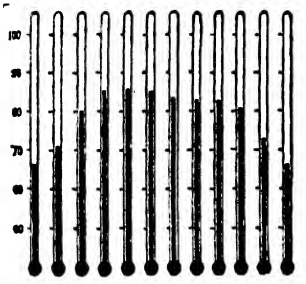


Fig. 29. Diagram of Calcutta temperature

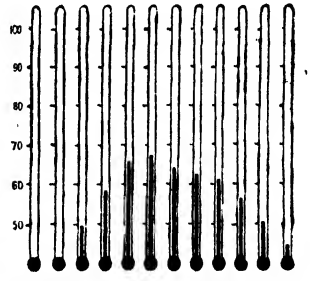


Fig. 30. Diagram of Simla temperature

last paragraph. Notice also that places with a big daily range have also a big annual range.

Before we leave this subject let us look at one place in the mountains. Fig. 30 shows you the monthly

temperatures at Simla, over 7,000 feet above the level of the sea. For the whole year Simla is much colder than any of the places nearby on the plains.

13. **Isotherms.**—We know that for every 300 feet we mount up a hillside the air gets one degree cooler, so that the tops of the mountains are very cold. That does not matter to us very much, because very few people live on the tops of the mountains. Yet in the hills there are many valleys where people do live, and the temperature of these places cannot always be shown in such maps as Figs. 20 and 21 without making the maps so full of different sorts of shading that they would not show anything clearly. You must remember, then, that Figs. 20 and 21 are only roughly correct in the hilly regions as they cannot show all the warmer valleys or the very cold hill-tops. Some countries have no great broad plains but consist just of a mass of mountains and valleys and the temperature of one place in a valley is quite different from that of another place a few miles away on a hill. In such a country the best thing to do is to take no notice of the height of the land as far as temperature is concerned. Since the temperature gets 1° less for every 300 feet we climb upwards, we are able to make the temperature of hilly places correspond with the temperature of places at sea-level. In order to do this we add one degree to the thermometer reading for every 300 feet a place is above sea-level. Thus if a village is situated 2,100 feet above sea-level, and we know its temperature is 63°, we can imagine that if the same village were situated at sea-level its temperature would be 63° + 7°, because 2,100 feet is seven times 300 feet and we must add 1° seven times to the thermometer reading. This is called 'Reducing the temperature to sea-level'. We can now draw a map of a country

without taking any notice of hills or mountains. We just mark on the map all places where thermometer readings are made and mark against each the temperature when reduced to sea-level. We can then draw a line through all places marked with the same temperature. Such a line is called an 'isotherm'. An isotherm is thus an imaginary line drawn through all places having the same temperature when reduced to sea-level. We can draw isotherms of monthly temperature for different months of the year.

In India, however, it is more important to study actual temperature, for then you can realize the importance of the cold mountain wall, and the great heat of the plains when the sun is shining over them.

## QUESTIONS AND EXERCISES

1. For, the 24 hours ending at noon on December 7, 1937, the maximum thermometer at Rangoon read 87·5° and the minimum 71·9°. Draw sketches showing the appearance of the two thermometers when they were seen by the man in charge.

2. What isotherms pass through the following places:—

| | | | |
|---|---|---|---|
| Calcutta | ... sea-level | 65° | (January) |
| Darjeeling | .. 7,200 | 42° | (January) |
| Simla | ... 7,200 | 39° | (January) |
| Lhasa | ... 12,000 | 27° | (January) |
| Karachi | ... sea-level | 65° | (January) |
| Bangalore | ... 3,000 | 70° | (January) |

3. What is the range of temperature between January and July at Trivandrum, Madras, Bombay, and Simla? Is this the same as the Annual Range of Temperatures?

4. Compare carefully Figs. 12, 20 and 21. Write a list of the principal mountain ranges and say what you notice concerning their temperature?

5. Look at Fig. 21. What is the meaning of the areas of 'more than 85°' shading in the middle of Peninsular India and in Central Burma? Why are they there?

# CHAPTER V

## CLIMATE (WIND)

1. **Temperature and Pressure.**—Cold air is heavier than warm air. When, therefore, the air becomes heated it becomes lighter and tries to rise upward, whilst the colder, heavier air flows in to take its place. Now when the air is trying to rise *upwards*, it will not be pressing down so heavily on the surface of the earth. So that, although we always have many layers of air above us, the air does not always exert the same pressure. In other words, we have regions of high pressure and regions of low pressure.

We have an instrument for measuring the pressure of the air. It is called a 'Barometer', from two Greek words meaning 'heavy' and 'measure'. It really measures the 'heaviness' of the air.

If you think about it for a moment you will understand that the pressure gets less as we go upwards, so that it is very small on the tops of mountains. Just as we took the temperature of places on the hills and reduced it to sea-level, so we can reduce the pressure of hill stations to their sea-level equivalents. You remember that lines drawn through places of equal temperature were called 'Isotherms'. Lines drawn through places of equal pressure when reduced to sea-level are called 'Isobars'.

There is one golden rule about pressure to remember. Taking sea-level pressures, air always moves from regions of high pressure to regions of low pressure. Moving air we call wind, and so, in other words, the

wind blows from regions of high pressure to regions of low pressure.

2. **Land and Sea Breezes.**—People who live near the sea coast often feel a strong breeze blowing from the sea. It blows during the afternoon but dies away in the evenings. We always name a wind after the direction *from* which it blows, so as this wind blows *from* the Sea it is called a 'sea breeze'. The cause of it is this. The sun shines equally on the land and on the sea, but the land takes in the sun's heat much

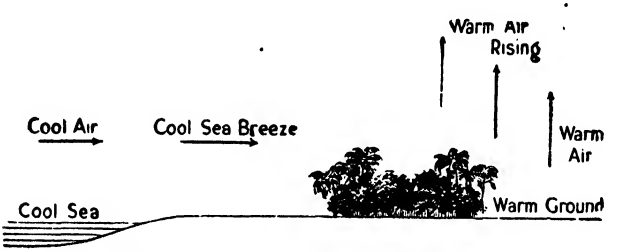



**Fig. 31. Land and Sea Breezes**

more easily than the water does. This you can prove for yourself on a hot day by touching the dry ground with one hand while you put the other into the water of a stream. You will find the land hotter than the water. When the land becomes heated, the air over it becomes heated also and the air over the land is hotter than the air over the sea. The warm light air over the land rises and the cooler, heavier air from the sea flows in to take its place, causing a cool, refreshing 'sea breeze'. Fig. 31 illustrates this movement by means of arrows.

After the sun has set, land and water begin to get cooler but the land loses its heat much more quickly than the water. Soon, the land becomes cooler than the sea, and the air over the sea, being now the warmer,

rises, and the colder, heavier air from the land flows in to take its place, forming a 'land breeze'. The land breeze blows during the night and dies away in the early morning. Land and sea Breezes are good examples of 'periodic winds', that is, winds which blow for certain periods only and not constantly.

3. **The North-East Monsoon.**—That which happens along the sea coast is a small example of what is going

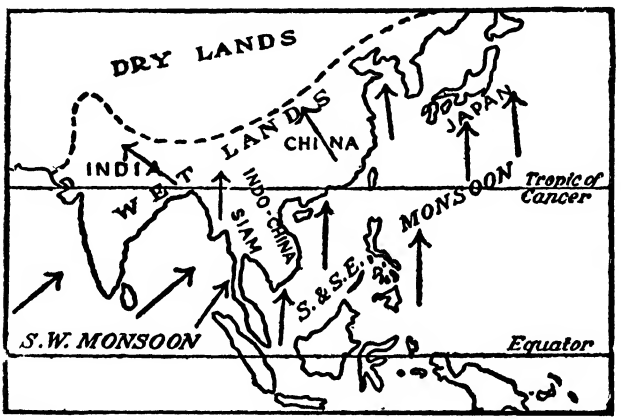



**Fig. 32. The Monsoon Lands of Asia**

on in the huge continent of Asia. Let us look first of all at the conditions during the cold season. Turn again to Fig. 20, the temperature map of India for January. The north of India is then cold, and it gets gradually warmer as we go southwards. The warm light air over the ocean to the south of India is rising and the cold heavy air from the land to the north flows in to take its place. In the cold season we have, then, a land wind from the north. Owing to the rotation of the earth it does not blow directly from north

to south, but is twisted and actually comes from the north-east. In India we often call it the 'North-East Monsoon Wind' but it is part of a great wind system which we find north of the equator all round the world and which we call the North-East Trade Wind.

1. **The South-West Monsoon.**—During the months of May to September the sun is shining vertically over

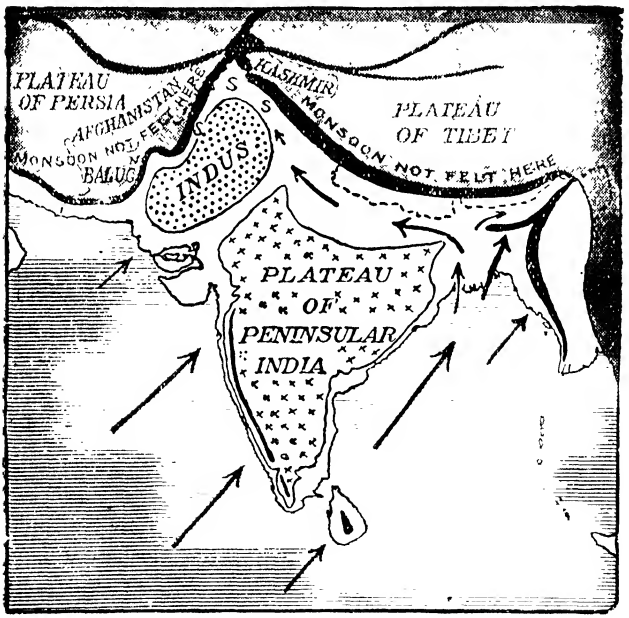



**Fig. 33. The Monsoon regions of India**

S, slight winds only.

India and the land becomes very hot indeed. Look again at Fig. 21 and notice the great July heat over the plains of the Punjab and over the centre of Burma.

The hot air over the land rises and the cool, heavy air from the sea blows in to take its place. This wind, too, is twisted by the rotation of the earth and its normal direction is from the south-west and so it is called the 'South-West Monsoon'. It commences to blow, in most parts of India, in June and continues to the end of September or October. Here we have another example of a 'Periodic wind'.

5. **The Monsoon Lands.**—In the matter of the Monsoon winds India and Burma are part of a much larger climate system which includes nearly all south-east Asia. Like India, Indo-China, China and Japan also have monsoon winds, as you see in Fig. 32.

There are certain parts of North-Western India lying outside the great mountain wall. These parts are Baluchistan and part of Kashmir. The South-West Monsoon, blowing towards the great low pressure area of the Punjab Plains, does not blow over the great mountain rampart and so Baluchistan and Northern Kashmir are *outside* the Monsoon Region. They belong to the 'Dry Lands' of Central Asia. Fig. 33 shows you clearly those parts of India which are outside the influence of the monsoon.

6. **Direction of the Monsoon Winds.**—The South-West Monsoon does not blow from the south-west in every part of India and Burma. The following table shows its direction in some places:—

| Place | Direction of Monsoon |
|---|---|
| Bombay | W.S.W |
| Madras | S.W. |
| Calcutta | S. |
| Allahabad | E. |
| Delhi | S.E. |

If these directions are shown on a map of the mountains of India, the reason for the differences becomes clear. The direction of the wind over the land depends

largely on the direction of the mountain ranges and the river valleys. It is much easier for the wind, just as it is for men, to travel along valleys than to cross hills. Study Fig. 34 carefully and notice the reason for the direction of the arrows in each case. The Plateau

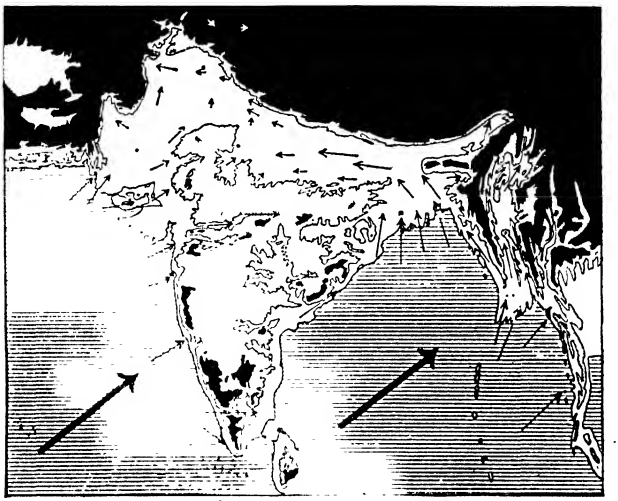


Fig. 34. Map of India showing Monsoon arrows

of Peninsular India really divides the monsoon into two halves. One half, called the Bengal Stream, blows over the Bay of Bengal and up the Ganges Valley. The other half, called the Arabian Sea Stream, blows over the Arabian Sea and strikes the Western Ghats.

The direction of the North-East Monsoon is also controlled by the mountain ranges in just the same way.

7. **The Sea and Temperature.**—In the last chapter we learnt that places near the sea have a small daily and

a small annual range of temperature. This is because the sea takes a long time to get warm in the hot weather, and only loses its heat very slowly in the cold season. The temperature on the sea does not vary nearly so much as the temperature of the land. So we find that places near the sea are kept cold in the hot weather and warm in the cold weather.

## QUESTIONS AND EXERCISES

1. What do you think is the normal direction of the South-West Monsoon at Karachi, Peshawar, Nagpur, Patna, Akyab and Colombo ?

2. Explain by sketch-maps the reasons for the direction of the wind at Jubbulpore (W. in July, E. in January).

# CHAPTER VI

## CLIMATE (RAINFALL)

1. **Evaporation.**—Have you noticed what happens after rain when the sun comes out? The drops of water lying on the ground and the small pools of water soon disappear and the ground becomes dry. Where has the water disappeared to? It has been changed from liquid water which we can see, into water vapour which we cannot see, but which floats away in the air. This change of liquid water into water vapour is called *evaporation*. The air is like a thirsty boy, continually drinking up all the water he can find. The hotter the air the thirstier he is. Cold air cannot hold nearly as much moisture or water vapour as hot air. Air, even if it is very hot, cannot drink up water where there is none. So we find that hot air over dry land, or wind blowing from the land, is usually *dry*. But the air over the sea, or wind blowing from the sea, especially in hot regions, is very moist.

2. **Condensation.**—Cold air cannot hold as much moisture as warm air. If moist warm air is cooled, there comes a stage when it contains as much water vapour as it can possibly hold; it is then said to be *saturated*. If it is cooled still more, some of the water vapour is changed back into liquid water. At first little tiny particles of water appear in the air (forming clouds or mist). Then the tiny particles collect together and fall to the earth as rain. If it is very cold (below freezing point), the little drops may be

**Fig. 35. Monsoon clouds rolling up against the Himalayas at Darjeeling in August**

changed into ice, forming hail or snow. The change from the invisible water vapour back into drops of water is called *condensation.*

3. **Dew.**—Condensation may also take place on the surface of the ground. At night when the earth gets very cold, it makes the air near it cold also and the air drops some of its water vapour on to the surface of the ground. This water is called *dew.* This explains why the fields are often wet in the early morning although there has been no rain.

4. **Rain.**—There are several different ways in which warm, moist air may be cooled so as to cause rain.

(*a*) The wind, that is, the moving air, containing the moisture, may be blowing towards a cooler place.

(*b*) As we ascend a mountain it becomes colder. That is because the higher layers of the atmosphere are colder than the lower layers. If the wind meets a

range of mountains it is forced to rise and becomes cooled and very heavy rainfall results. Rains caused in this way by the relief or physical features of the land are called 'relief rains'. Fig. 36 illustrates this kind of rainfall.

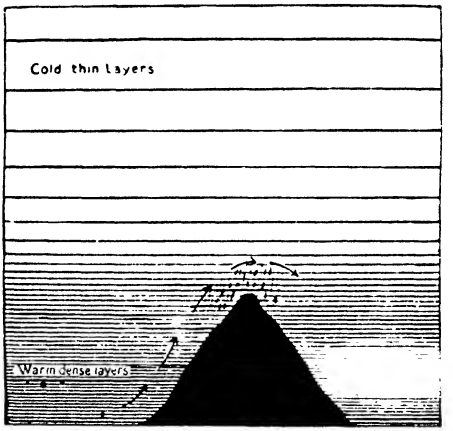



**Fig. 36. Showing air rising from a region of warm dense layers to a region of cold thin layers, when crossing a range of hills**

(*c*) We have said that warm air is light and rises. It must, of course, rise into the higher layers of the atmosphere where it is colder. The warm air is cooled and rain falls. Notice that in this case no wind is necessary, the rain falls in the same place from which evaporation took place. Such rains are called 'convection rains'.

5. **Measuring Rainfall.**—Just as careful records of temperature are kept all over India, so the rainfall is

measured day by day. Rainfall is very, very important for our crops and so the rainfall is recorded in a much larger number of places than the temperature. The instrument for measuring the amount of rain which falls is called a 'rain gauge'. Fig. 37 is a picture of one. The raindrops fall into the mouth of the funnel and run down into a can inside. As the can is inside a jar, the water cannot evaporate or 'dry up'. Every day the jar is opened and the can taken out. Then the rain water in the can is poured into a glass which has divisions marked on it. Suppose that on a certain day the rain water from the can fills the glass up to the 1·5 mark. This will mean that 1·5 inches of rain has fallen during the day. That is, if all the rain which fell on the ground in that place had stayed still on the top of the ground and had not run into streams, or soaked into the ground or dried up, it would have formed a layer 1·5 inches deep.

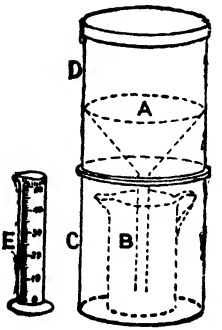


Fig. 37. A rain gauge

6. **Recording Rainfall.**—Everyday the observer in charge of the rain gauge writes down the rainfall for the day. At the end of the month these amounts are added up and we get the rainfall for the month. Now notice carefully that this is different from the recording of temperature. There we had to find the *average* temperature. With rainfall it is the total for the month which we require. On page 38 in Chaper IV you have the records of a place for the month of October, 1937.

At the end of the year we add up the totals of each of the twelve months and that gives us the total rainfall for the year.

But some years are wetter than others and so we have to find the average over a number of years thus: —

| Place | Year | Rainfall for the year |
|---|---|---|
| | | inches |
| A town in the middle of Bengal ... | 1928 | 79·8 |
| | 1929 | 89·0 |
| | 1930 | 69·4 |
| | 1931 | 80·1 |
| | 1932 | 88·3 |
| | 1933 | 80·4 |
| | 1934 | 82·1 |
| | 1935 | 74·3 |
| | 1936 | 76·4 |
| | 1937 | 76·3 |
| | | 10)796·1 |
| Average annual rainfall ... ... | | 79·6 inches. |

7. **Seasonal Rainfall.**—In the last chapter we learnt that there are two principal winds in India. The North-East Monsoon blows from October or November onwards, whilst the South-West Monsoon commences about June and blows on till September. The North-East Monsoon blows from a land mass and is therefore a dry wind; it is blowing towards a place which is warmer than itself and so becomes thirstier as it goes. It is therefore a dry wind over nearly the whole of India. But the South-West Monsoon is blowing from the sea and from a warm region (the equator). It is therefore a wet wind. In India it meets numerous ranges of hills and mountains and so heavy relief rains are caused. This rain will fall while the South-West Monsoon is blowing, that is, from about June to September.

In order to indicate this more clearly, we can show the monthly rainfall in each of a number of towns by means of lines. Study Figs. 38 to 40 carefully.

8. **Rainfall Maps.**—Rainfall is so important in the life of a country that it is very useful to have a map on which we can see at once which parts of the country

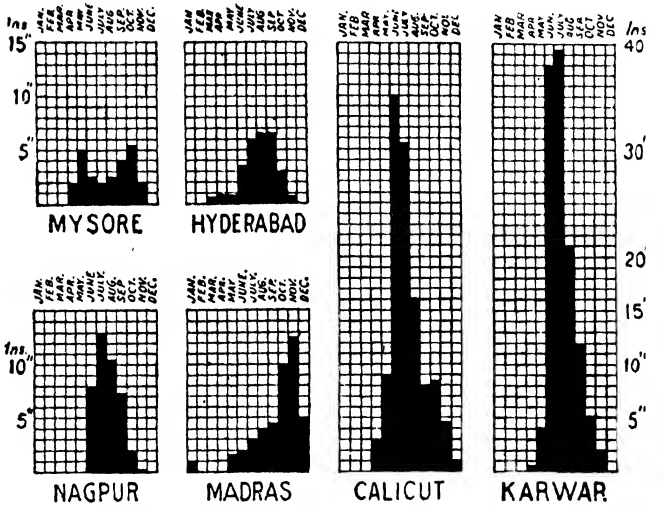



**Fig. 38. Rainfall graphs of Indian towns**

have heavy rain, which parts moderate rain, and so on. We can draw such a map showing the rainfall for one month only, or for a number of months, or for a year. The most useful one is the rainfall map showing the average rainfall for a whole year. In India it is only necessary to remember that most of the rain falls from June to October.

To construct a rainfall map we take a map of the country, mark against each place the annual rainfall

and then draw lines joining places with equal rainfall. Such lines are called 'isohyets' or 'rainfall lines'.

Fig. 41 is a very simple Rainfall Map of India for the year. Notice that it has marked on it only four

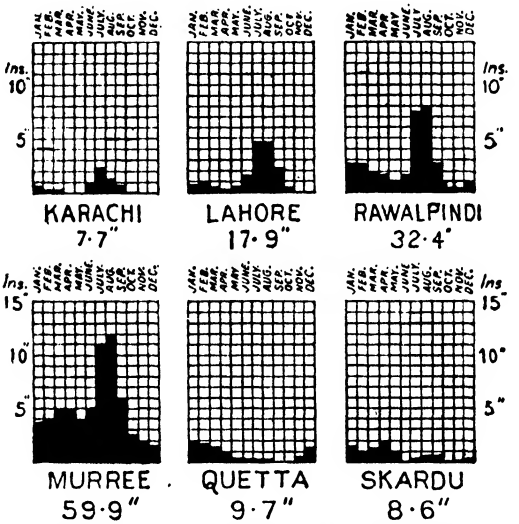



**Fig. 39. Rainfall graphs of Indian towns**

rainfall lines. These lines divide India into four parts:—

(*a*) Good Rainfall Division with more than 80 inches in the year. In the plains rice is everywhere the most important crop and the hills are covered with thick evergreen forest or jungle.

(*b*) Moderate Rainfall Division with between 40 and 80 inches of rain in the year. In the hills fine forests of valuable teak and sal trees flourish with this rainfall. In the plains many crops can be

grown without irrigation and there is a mixture of dry zone and wet zone crops.

(*c*) Poor Rainfall Division with between 20 and 40 inches of rain. Here the dry zone crops such as

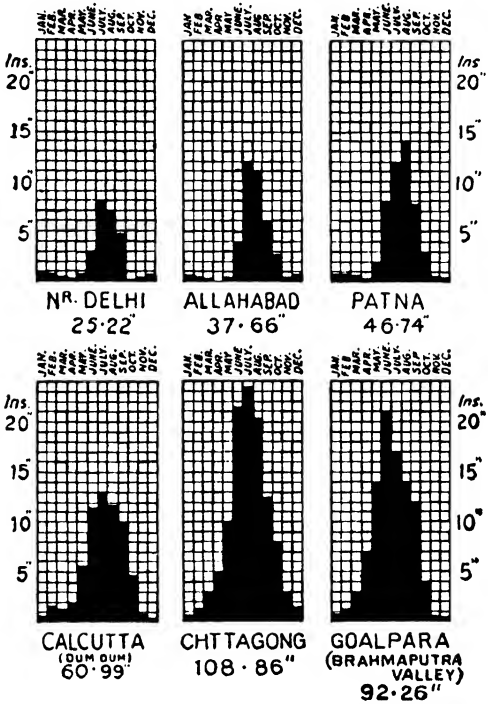



**Fig. 40. Rainfall graphs of Indian towns**

millet, grow; wet zone crops, such as rice, can only be grown with the help of irrigation. The hills are largely covered with scrub, because it is not wet enough for forests to grow properly.

(*d*) Desert and Semi-Desert with less than 20 inches of rain. It is almost impossible to grow any crops at all without irrigation.

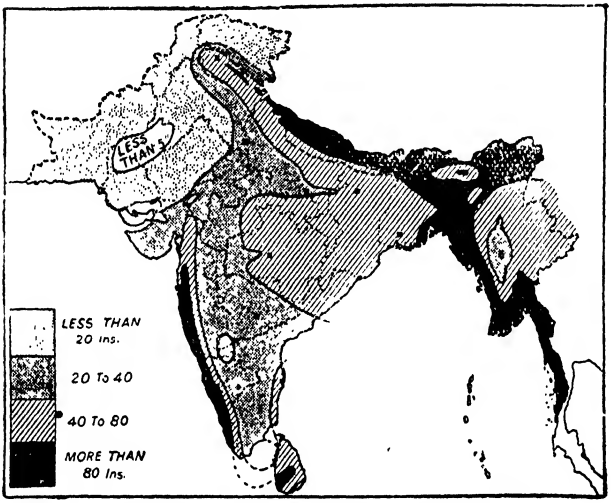



**Fig. 41. Rainfall map of India**

In the centre of Peninsular India a small patch has been left blank. How should it be shaded and why?

These rainfall divisions of India are so important that we must try to carry a picture of Fig. 41 in our minds.

9. **Rainfall in Southern India and Ceylon.**—In most parts of India the rains cease in September or October, but the Madras Coast in Southern India and Ceylon (especially the north-eastern half) get a considerable amount of rain in October, November and December. This is shown clearly in Fig. 42. If you study the map you will notice that the North-East monsoon has

to Cross the sea before reaching these parts of India. Consequently it collects some moisture and deposits it on the coast, especially soon after the South-West Monsoon has changed round into the North-East.

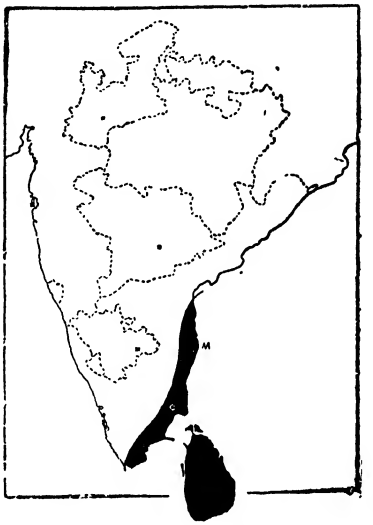


Fig. 42. Map showing the part of Peninsular India which has more than 10 inches of rain in November and December

There is another region which receives rain in the later months of the year. That is the extreme south. Lands on the equator receive convectional rains through the whole year, and as southern India is near that region it receives some rain during the months which are dry in other parts of India. The same is true of Ceylon and southern Burma.

Baluchistan and Northern Kashmir are both outside the Monsoon region. They are both very dry, but receive their rain or snow mainly in the colder months. Similarly winter storms bring some rain in the cold season in the Punjab.

10. **Rain-Shadows.**—Look back at Fig. 41 and notice the very heavy rainfall on the West Coast and the very small rainfall in the interior of Peninsular India.

This is because the moisture-laden winds, blowing from the south-west, strike the Western Ghats. The wind has to rise, is cooled and deposits a very heavy rainfall. When the wind has crossed the Ghats, it descends slightly to the level of the Plateau. That is,

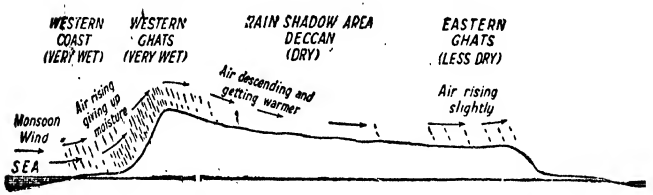



**Fig. 43. Section across the Western Ghats showing Rain-Shadow**

as you see from Fig. 36, it goes down into the warmer layers of the atmosphere again and so gives up very little of the moisture it carries. When light falls on an object, a shadow is formed on the opposite side of the object. In the same way, when rain falls on one side of a hill, there is a 'shadow' of dryness on the other side. The dry area is called the 'Rain-Shadow'. The centre of Peninsular India is in the 'Rain-Shadow' of the Western Ghats. Fig. 43 shows this clearly.

Again, the centre of the Brahmaputra Valley in Assam is in the rain-shadow of the Khasi Hills. Cherrapunji, on the Khasi Hills, catches the full force of the monsoon and has one of the heaviest rainfalls in the world.

11. **Storm.**—Thunderstorms usually occur in India just about the beginning and end of the 'Rains'. When the North-East Monsoon has died away and the South-West Monsoon is just about to commence, the atmosphere is very disturbed, and thunderstorms

occur. The same thing happens when the South-West Monsoon changes to the North-East, in October.

Violent storms often occur in the drier parts of India. There the sun shines very brilliantly and the land becomes very hot by day, but at night gets very cold. The great difference in temperature often causes severe storms, which may sweep across India and do much damage. Dust storms in the deserts are much to be feared, as are the cyclones at sea.

12. **Climate and Weather.**—The temperature, pressure, movement and dampness of the atmosphere constitute the weather. In other words, all these things working together give us the 'weather'. We may pick out the most noticeable feature, such as the heat, and say we have had very hot weather to-day, or we may say 'the weather has been very stormy this week'. The word weather applies to short periods such as a day, week or month. In the last three chapters, however, we have dealt very largely with the *averages* of temperature, rainfall, etc., of a large number of years. When we study averages we get an idea of the average, or normal state of the year. This constitutes the 'Climate' of the country. In other words, climate is the normal or average state of the weather. We say India has a monsoon climate, because normally the South-West Monsoon blows from June to September and brings rain to the country.

13. **The Seasons.**—Summarising what we have learnt of the climate of India, we may divide the year into three parts:—

(*a*) The Cool Season, from about the middle of October to the end of February, when the temperature is comparatively low, and there is little or no rain.

(*b*) The Hot Season, from March to June, when

the sun is shining vertically over India and the land gets very hot.

(*c*) The Rainy Season, from about the middle of June to the middle of October. The South-West Monsoon is blowing and bringing the rain. It is cooler, because the clouds protect the land from the sun and the rain cools the air.

The Rainy Season commences, or, as we say, the rains break, at slightly different times in different parts of India, but June 15 is a normal time in many places.

### QUESTIONS AND EXERCISES

1. Explain why the rain falls on the windward side of hills.
2. Explain the reasons for the rainfall of Akyab (196 in.), Mandalay (33 in.), Nagpur (47 in.), Bombay (80 in.), Mysore (29 in.) and Multan (5 in.).
3. Look at Fig. 41. About how much rain falls during the year at Trivandrum, Hyderabad, Waltair, Allahabad, Dacca, Simla and Karachi? If you do not know where all these places are, find them in your atlas.
4. Look at the Rainfall Graphs of Towns (Figs. 38-40). Make a list of the towns and mark against each the months in which most rain falls and in which least falls.
5. Draw a section across the Brahmaputra Valley showing the Rain-Shadow.
6. Draw diagrams illustrating 'convection rains'.

*

# CHAPTER VII

## NATURAL VEGETATION

1. **Natural Vegetation.**—Natural Vegetation is the name which we give to the jungle and the forest or grass which grow by themselves untouched by man. If there were no people at all living in India, the whole of the country would be covered with its natural vegetation. Actually, however, there are enormous numbers of people living in India and they have cleared away the jungle and made fields in which to grow their rice or millet or other crops. Some parts of India, such as the Ganges Valley, are so fertile that practically no natural vegetation is left. It has all been cut down. But in other parts of India where there are fewer people, a great deal of the country is covered with the vegetation which grows naturally without the help of men. It has only been cleared away near towns and villages. In this chapter we are going to study the different kinds of natural vegetation which occur in India.

2. **Vegetation and Rainfall.**—Why should not the jungle be exactly the same all over India? That is certainly not so, for in some places we find evergreen forests of huge trees, whilst in other places there is nothing but a few scrubby bushes. There are two main factors, as we call them, which make the difference in vegetation. These are *rainfall* and *elevation* (or height above sea-level). Generally, the heavier the rainfall, the thicker is the vegetation. In the

wettest places of all we may find high evergreen forest whilst in the driest places it may be difficult for any plants to grow at all, and we find only desert. Then, as we ascend the mountains, it becomes much cooler through the whole year and so the trees change. The first important change occurs at a height of between 3,000 and 5,000 feet above the level of the sea, largely as a result of frost, which kills the young seedlings of many tropical trees.

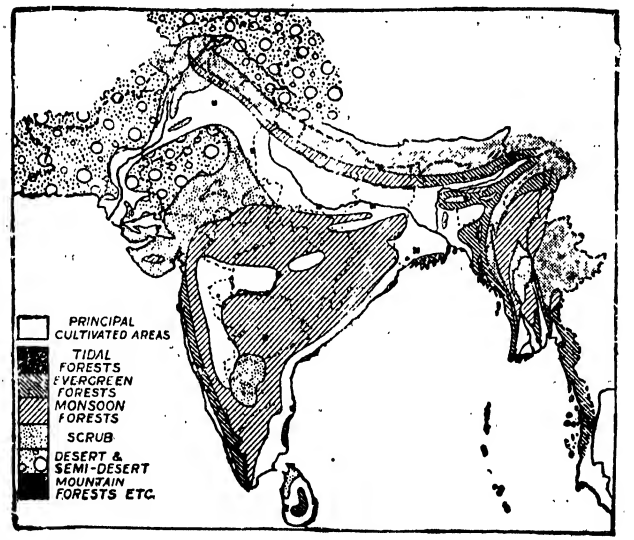
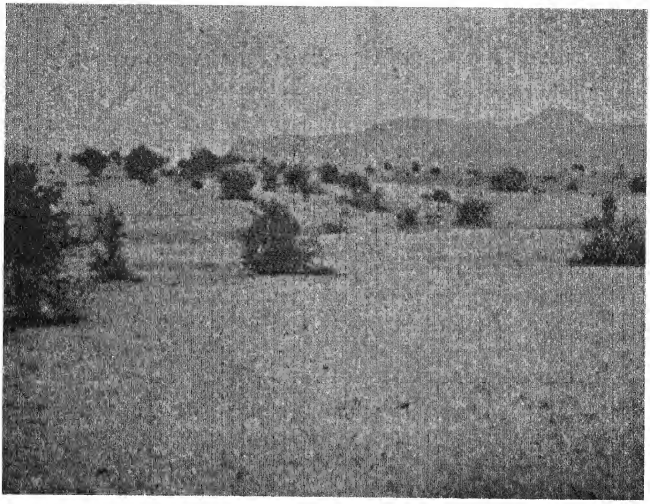



**Fig. 44. Map of the natural vegetation of India**

The following are the principal kinds of natural vegetation in India: —

3. **Evergreen Forest.**—When the rainfall is more than 80 inches in a year (see Fig. 41) we find forest



[*Photo*: *L. D. Stamp*

**Fig. 45. Typical open scrub forest growing with a rainfall of about 30 inches in Peninsular India (State of Hyderabad)**

in which the trees are green all the year round. There are many different kinds of trees in these forests, often they are of very large size. But the wood of the trees is usually very hard and up to the present has not been much used commercially. It is difficult to find a market, except for firewood, for so many different *kinds* of wood. In these areas of very heavy rainfall nearly all the lowland has been cleared to make room for paddy fields, but we find the forest, the natural vegetation, on the hills. It is found on the slopes of the Western Ghats, in the wetter eastern parts of the Himalayas up to 5000 feet above sea-level, Assam, the Arakan Coast of Burma and lower Burma. Study Fig. 44 and note where it occurs.

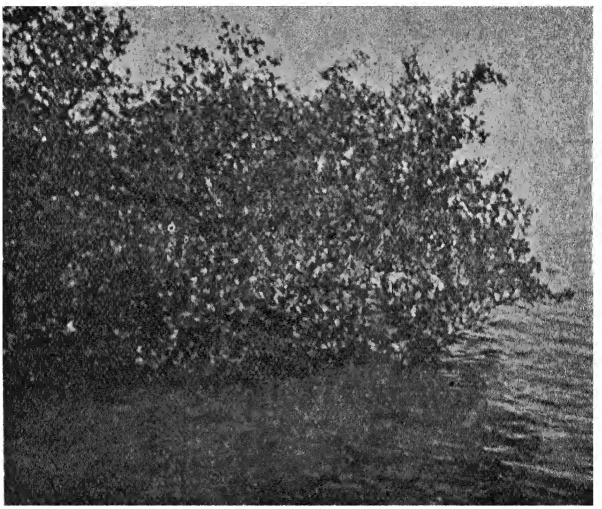
4. **Monsoon Forest.**—Where the rainfall is more than 40 inches but less than 80 inches the forest gets very dry in the hot season. The trees lose their leaves to protect themselves against the heat of the sun, and so the forest is leafless for part of the year. Such forests of good large trees, but which are not evergreen, we call 'Monsoon Forests'. They are very valuable, for in them grow the most important trees of India. The two most important trees are the Teak, which comes from Burma and the western part of the Indian Plateau, and the Sal which grows along the lower slopes of the Himalayas and in the north-east of the Plateau. The monsoon forests are so valuable that they are largely 'reserved' by Government to prevent them being destroyed by careless and wasteful use.

5. **Scrub Forest and Scrubland.**—Where the rainfall is less than 40 inches a year, we find it is usually too dry for forests to grow properly. A few trees grow but most of them are armed with spines or thorns to prevent them from being eaten by animals. Forests of small thorny trees are called Thorn Forest. Sometimes the trees are so small that they are really only bushes and are often far apart. We call such land 'Scrubland'—it is very like the savana lands of Africa because the ground between the trees is covered or partly covered with grass. Scrubland covers large areas in the drier parts of India and Burma, In Peninsular India, where there happens to be good soil on hill slopes, better forests may be found although the rainfall is only just over 30 inches. One of the most useful trees in these dry parts is the Cutch from which a yellow dye is made.

6. **Desert and Semi-Desert.**—As the climate gets drier and drier, so the thorny trees and bushes become

rarer. Instead we find plants with thick, fleshy stems and leaves and very long roots, which store up water in their fleshy stems and leaves.

7. **Grassland.**—There is not much true grassland in India. Patches occur on hilly regions, interrupting the Monsoon forests.



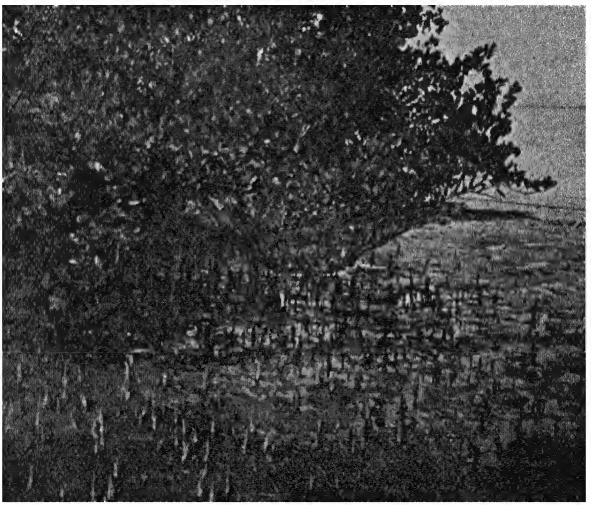
[*Photo*: *L. D. Stamp*

**Fig. 46. Part of a mangrove swamp at high tide showing the water right up to the level of the leaves (Elephanta Island, Bombay Harbour)**

8. **Mountain Forests.**—On the hills and mountains of Southern India above 5,000 feet and in Burma and on the Himalayas above 3,000 feet we find a great change. The forests above those levels are more like those found in Temperate Lands. The forests are evergreen; some of them are of broad-leaved trees like

the oak; others have tall unbranched trees with needle-shaped leaves (Coniferous or Pine Forests). You will learn more about these when we come to study the Himalayas.

9. **Alpine Vegetation and Alpine Forests.**—On the highest parts of the mountains it is too cold for trees



[*Photo*: *L. D. Stamp*

**Fig. 47. The same mangroves at low tide, showing the 'aerophores' from the roots sticking up through the mud**

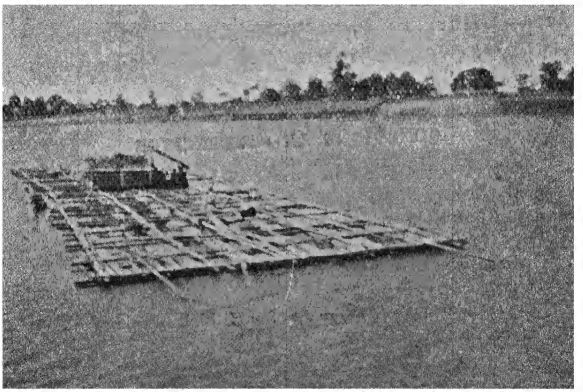
It is through these that the roots can breathe.

to grow. We find only small bushes and short grass, or where it is very dry, practically nothing at all. The very highest parts of the mountains of Northern India (above 18,000 feet) are always covered with snow.

10. **Mangrove Forests.**—There are certain trees which must have their roots covered by salt water

at every high tide. The mangroves are the most important. We find them growing along the sea coast where it is flat and muddy and in the great river deltas. The mangrove forests of the Ganges Delta are called the 'Sundarbans', from *sundri*, the Bengali name for mangrove.

11. **Useful Forest Products.**—The most valuable timber is teak. The Sal gives a good timber also.



[*Photo*: *L. D. Stamp*

**Fig. 48. A timber raft floating down the great Irrawaddy River in Burma**

The timber is teak and is being sent to saw-mills in Rangoon.

The Pine trees of the mountains yield fine soft wood, as well as timber and resin, but the forests are difficult to reach. Many of the poorer kinds of wood in all parts of India are used for firewood. The mangrove forests are found in deltas where no other wood is available and are therefore valuable for the fuel they yield. Bamboo is really a very large grass and grows

in many parts of India but especially in the Monsoon Forests. It is used for very many purposes. Another forest product is lac, a sticky substance produced by insects living on the forest trees, especially in the north-east of the Plateau.

The method of working the timber of the forests is interesting. It is cut in the dry season and dragged to the small streams by elephants or buffaloes. When the rains come, the streams rise and the logs are floated down to the bigger rivers. These logs are joined together to form 'rafts' and floated down the rivers to saw-mills where the wood is cut up into planks (see Fig. 48).

### QUESTIONS AND EXERCISES

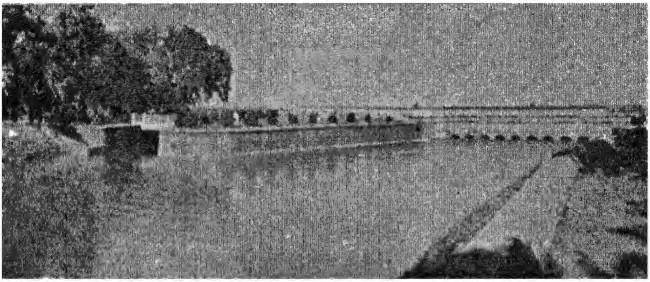
1. Think of some object in your home made of wood and try to describe all the events that took place since the tree of which it was made was growing in the forests.
2. What is the natural vegetation of the Ganges Valley? Why?
3. Draw a sketch-map of India, shading the parts where useful timber is produced.
4. Why is the teak tree never found high up in the Himalaya Mountains or in Baluchistan?

# CHAPTER VIII

## IRRIGATION IN INDIA

1. **Irrigation.**—In the last chapter we learnt that forests would not grow properly with much less than 40 inches of rainfall and that with less than 30 inches it was difficult to grow trees at all. The same is true of many food crops. Yet many of the dry parts of India have very many people. How then is it possible for a large population to live in such dry regions? Although the rainfall is very small, there are sometimes large rivers running through the regions and the water from the rivers can be brought to the fields to nourish the crops. There are other sources of water besides rivers. The artificial bringing of water to the fields is called irrigation. We will now consider briefly the different kinds of irrigation. In no other country of the world is irrigation as important as it is in India.

2. **Perennial Canal Irrigation.**—By far the most important type of irrigation is by means of canals which have water in them all the year round. Many of the canals are hundreds of miles long and the construction of them costs enormous sums of money. It is only when there is a strong and wise Government that such works can be constructed. The British Government has spent the tremendous sum of 150 crores of rupees on irrigation works in India and 50,000,000 acres have been made fertile for the poor farmers. The most important works are in the drier parts of the great Plain of Northern India—in the Punjab, United Provinces and Sind. Although the



[*Photo: L. D. Stamp*

**Fig. 49. The head of the Agra Canal, on the River Jumna below Delhi**

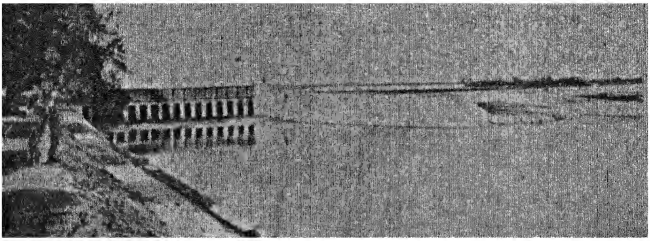
Notice the great lake or reservoir in the distance; the 'lock' on the left through which barges can pass and the sluice gates on the right which control the amount of water entering the canal.

rainfall in these parts of the Plain is poor, there is a good rainfall, as well as a heavy snowfall, on the Himalaya Mountains to the north. As a result, the rivers which rise in those mountains are never dry but are always bringing water down from the mountains to the plains. In some seasons of the year there is more water than at others. It sometimes happens that most water is required for irrigation when the river is at its lowest. The first stages in developing a great irrigation scheme are

(*a*) to choose a suitable spot on the river where its supply of water can be tapped—usually where the mouth is a good, firm rocky bed and is not too wide;

(*b*) to build across the river a wall (called a dam or weir) so that the water can collect behind to form a lake which will never be dry. In the rainy season more water will flow into this lake than is required and it is allowed to escape over the wall. But in the dry season nearly all the water in the lake will be used for the canal.

The dam or weir from which the canal starts is called the 'head' of the canal. The main canal is



[*Photo: L. D. Stamp*

**Fig. 50. The weir or dam across the River Jumna below Delhi**

On the right it can be seen that the river bed below the dam is almost dry. On the left are the sluice gates through which the water from the reservoir is allowed to escape down the river when there is more water than the canal needs.

then cut right across the country. The slope of the canal is very, very gentle so that the water only moves slowly and not rapidly as it does in many rivers. Often the surface of the land slopes more rapidly than is desirable for the canal and so the canal has to be built upon an embankment. From the main canal big branch canals are constructed. The water is actually distributed to the land through a series of small side branches called distributary canals. The amount of water passing into these small canals has to be very carefully regulated.

Besides the great works in the Great Indo-Gangetic Plain—the greatest of which is the Sukkur Barrage, in Sind, completed in 1932—there are important canal systems in Mysore and Madras about which you will learn in later chapters.

3. **Inundation Canals.**—In Sind and in certain other parts of India canals were constructed, starting from the bank of a river. The water of the river overflows into them in the flood season, but in the hot season the canals dry up, so that they are not nearly

so useful as the permanent canals. The inundation canals are gradually being replaced by perennial canals.

4. **Tanks.**—In most of the drier parts of Peninsular India mud walls are built across the valleys of small streams so that water collects and forms a pond or

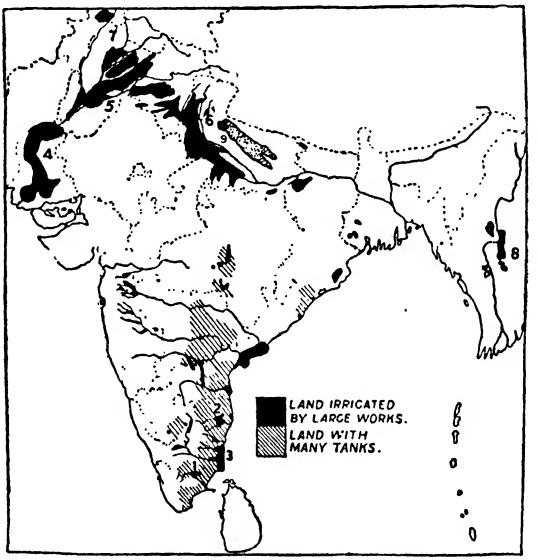
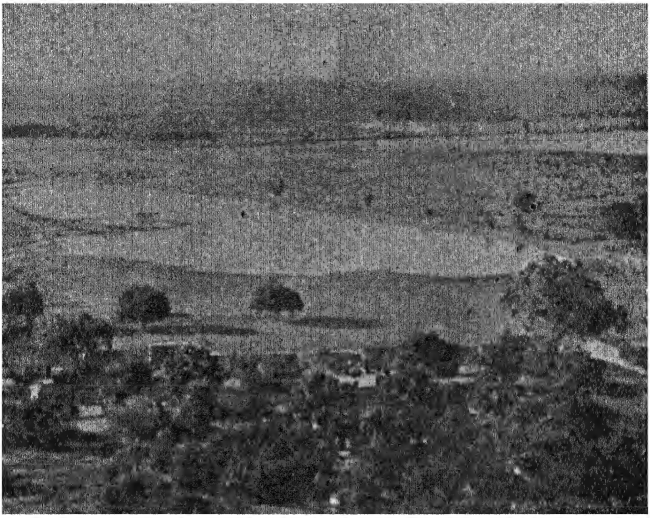



**Fig. 51. Irrigation in India**

1, Periyar system; 2, Poini, Palar and Cheyyar system; 3, Cauvery Delta system; 4, Sukkur Barrage and Sind Canals; 5, Punjab Canals; 6, United Provinces Canals; 7, Peshawar Canals (Swat Canals); 8, Upper Burma Canals; 9, Sarda Canals.

lake during the wet season. Such ponds or lakes are called 'tanks'. When the rainy season is over, the water from the tanks can be used, but in the hot season the tanks dry up completely. In bad rainfall years the tanks may not even be filled during the rains.

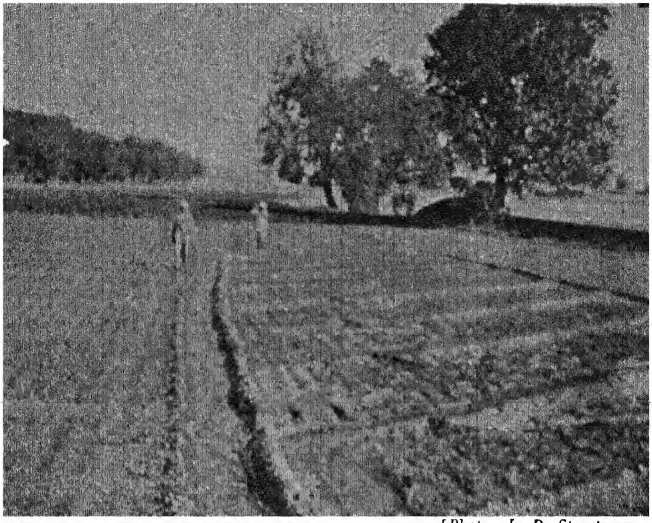


[*Photo*: L. D. Stamp

**Fig. 52. A tank near Madras**

In the centre can be seen the dam or bund; on the left is the tank and on the right the irrigated rice fields. Notice that the village has been built where it will not be flooded.

5. **Wells.**—Although the surface of the land may be dry in the drier regions, there is often water at a short distance below the surface. This water can be reached by wells and brought up to water the surface. Most of the wells are dug by hand and the water is drawn up by bullocks, as shown in the pictures. Other means are also used of raising the water. Water is also found in large quantities at great depths. This can be reached by deep tube-wells but the water must be pumped out. Over large areas in Northern India, as in the United Provinces where there are no large canals, electricity is now being used to pump the water from the new deep wells.



[*Photo*: *L. D. Stamp*

**Fig. 53. Well irrigation near Delhi**

The water is drawn up from the well by oxen walking down a slope.

6. **Karez.**—In Baluchistan, but in no other part of India, there is a very clever system of irrigation. The rainfall on the hills is greater than on the plains and when the little streams from the hills reach the plains, the water sinks into the ground. Long underground tunnels called 'karez' have been constructed to reach this water at the foot of the hills and to bring it out on to the alluvial plains.

Fig. 51 shows you the more important irrigated regions in India.

7. **Famine.**—In times past India has suffered terribly from famine. The parts which suffer most are those parts which have a moderate rainfall but which depend entirely on 'dry' crops. In bad rainfall years the crops may fail and the people be without

food. Notice that famine is not to be feared in tracts

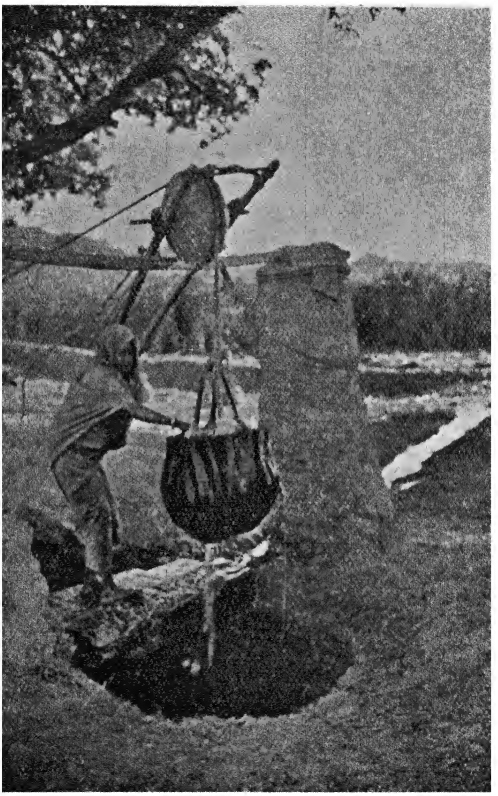


**Fig. 54. Showing the water being poured from the skin 'bucket' into a little canal**

irrigated by large works but in the dry parts where irrigation cannot be carried out. The drier parts of

the plateau suffer most. In the old days many thousands of people perished, but now there are rail-

**Fig. 55. The water is then led on to the land, each small square being allowed just enough**

The farmer is controlling the flow of water with his hands; as each little square has had enough he closes up the gap in the tiny bund with mud.

ways and food can be sent quickly from one part of the country to another.

# CHAPTER IX

## AGRICULTURE (ARTIFICIAL VEGETATION)

1. **Agriculture in India.**—We said in the last chapter that the natural vegetation or jungle has been cleared away over large areas in India in order to make room for man to grow his crops. Over very large areas such as the Ganges Plain, there is no natural vegetation left at all. India has a very large number of people and they all require food to live. There are 340,000,000 people and 340,000,000 acres of the country are cultivated. After all the people have been fed, there are still some food grains as well as other crops left over. These are sent to other countries in exchange for their goods which India needs.

You will notice that there is roughly an acre of cultivated land for every person in India. An acre is about the size of two football fields. Nine out of every ten people in India get their living from agriculture—as the growing of crops is called—so India is called an 'agricultural country'.

We said that the natural vegetation of a country depends mainly upon rainfall. Rainfall, too, is one of the most important things to consider with regard to crops, but there is one very great difference. Man is able to bring water artificially to his crops so that even in a dry country with very little rainfall he can still grow crops which require a lot of moisture if he can get water for his fields. The artificial watering of the land is called irrigation. We will now consider some of the most important crops in India.

2. **Rice.**—Rice requires considerable heat from the sun, and a great deal of water. The young rice plants need to be completely covered with water. Therefore rice is grown where there are heavy rains to flood the land or where man has built canals which can bring plenty of water to his fields (irrigation). The fields

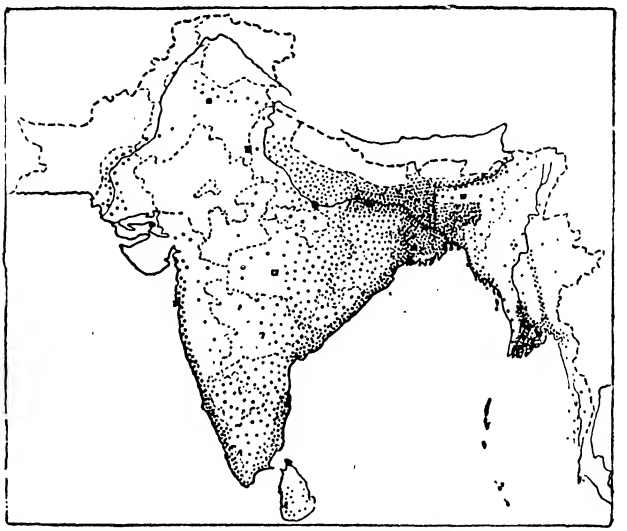


**Fig. 56. The distribution of rice**

Each dot represents 50,000 acres. Notice that most of the rice is grown on flat, alluvial land where the rainfall is good. Where is rice grown with the help of irrigation?

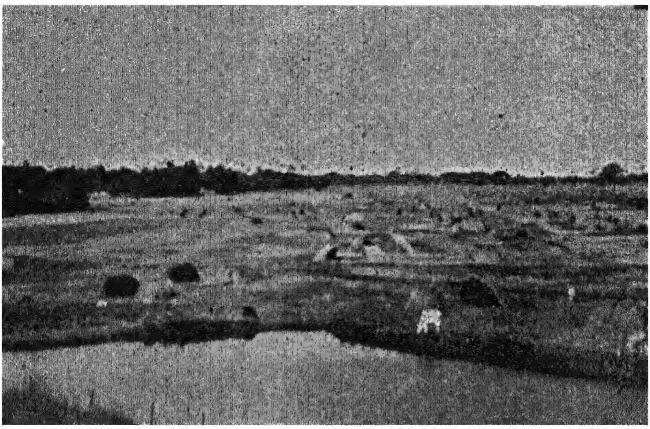
must be flat, so that the water does not run off the fields. The most important rice districts are therefore flat lands where the rainfall is very heavy. Fig. 56 shows this very clearly if you compare it with Figs. 12 and 41. In these parts of India rice is the principal food of the people or, as we say, their staple food. In drier regions rice becomes less important, though it

**Fig. 57. Rice—ploughing the flooded rice-fields with oxen**

This picture was taken in the delta of the River Irrawaddy in Burma.

is grown even in the driest regions (e.g. Sind) with the help of irrigation.

3. **Wheat.**—Wheat is a grain which is very much valued by white races and forms their principal food. Wheat is also a favourite food grain in the drier parts of Northern India. It is there a winter crop so that the land can often be used for other purposes during the rest of the year. It is sown at the end of the rains and ripens at the end of the year before the great heat commences. So much is grown that there is, in good years, some left over to be sent to Europe to feed the people who are busily engaged in industry there. Unlike rice, wheat requires only a moderate



[*Photo : L. D. Stamp*

**Fig. 58. Rice—harvest time**

The rice has all been cut and is now piled up in heaps ready to be carted away (Plains of Bengal, 50 miles west of Calcutta).

amount of water and would be killed if the young plants were covered by water as rice is. Wheat is a very important crop in the Punjab and many of the northern parts of India where the rainfall is less than 40 inches. As we travel down the Ganges Valley into wetter regions, it gradually disappears. This can be seen from Fig. 59.

4. **Barley.**—Barley is another important crop which grows largely in the same districts as wheat.

5. **Millet.**—The millets are small grains which form the 'staple' food of the people in most of the drier parts of India. There are several different kinds, the three principal being cholum or *jowar*, cumbu or *bajra* and ragi or *marua*. Where the rainfall is less than 40 inches, millet is everywhere important and it can be grown without irrigation even when the rainfall is as low as 20 inches. When the rainfall exceeds 40 inches it quickly disappears. Fig. 60 shows the distribution of millet.

6. **Maize.**—Maize is grown both for its grain (Indian corn) and as fodder for cattle. In India it flourishes both on the plains and in the hills where the rainfall is moderate. We find it with millet in dry regions, but also in damper regions, too. But in the lower Ganges Valley with a rainfall of 60 inches it disappears.

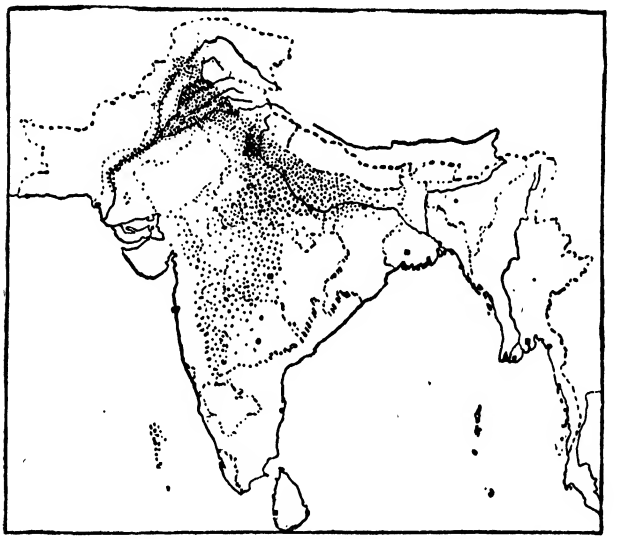


**Fig. 59. The distribution of wheat**

Each dot represents 20,000 acres.

7. **Pulses.**—Pulses of many different kinds are cultivated throughout the country. The most important is gram, which affords a good food as well as fodder for cattle and horses.

8. **Sugar-cane.**—Sugar-cane is grown in nearly all the provinces of India, but most comes from Bihar and from the irrigated lands of the Upper Ganges Valley

and the Punjab. A few years ago India did not make nearly enough sugar and gurh (or jagri) for her needs and huge quantities had to be purchased every year, especially from Java. But now there are numerous sugar-mills, notably in the Middle and Upper Ganges

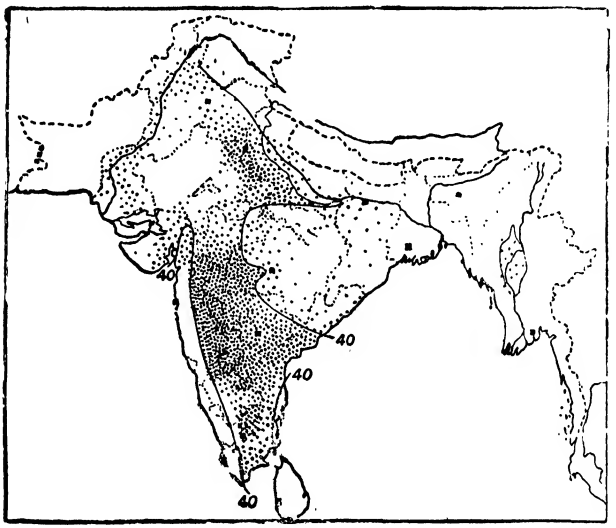



**Fig. 60. The distribution of millet**

Each dot represents 50,000 acres. The lines marked 40 are the 40-inch rainfall lines. Notice that nearly all the millet is grown where the rainfall is less than 40 inches.

Valley and India has become practically self-supporting in sugar.

9. **Cotton.**—We now come to crops which are not grown for food. One of the most important is cotton. The cotton itself is obtained from hairs in the seed-pods. When these pods are open, the seeds inside are seen to be wrapped in a mass of cotton fibres. The

value of the cotton depends largely on the length of the hairs and there are many different varieties. In India there are two principal kinds.

(*a*) Native Indian cottons with short hairs or, as we say, 'short-stapled' cotton.

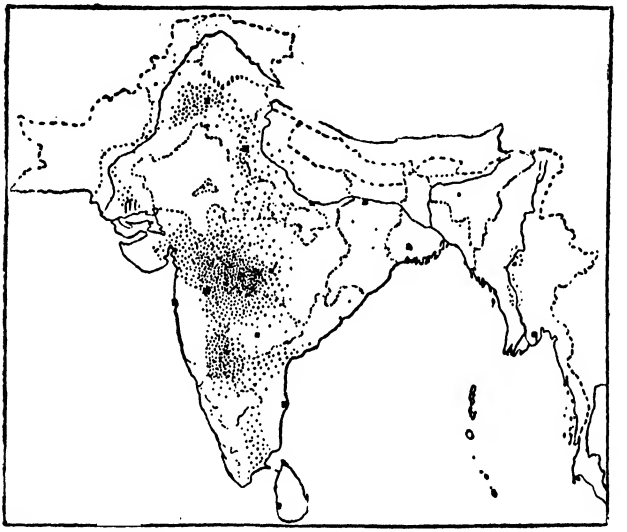


**Fig. 61. The distribution of cotton**

Each dot represents 20,000 acres.

(*b*) American cotton, of which the plants were originally brought from America, which has much longer hairs and is much more valuable.

Cotton is a dry region crop and flourishes where the rainfall is less than 40 inches. The soil is important, one of the best is the sticky black cotton soil produced by the weathering of the Deccan Lavas. The American cottons require more moisture and have to be

grown on irrigated and carefully prepared soil, as in the Punjab. Fig. 61 shows the distribution of cotton.

10. **Jute.**—Jute is a crop which is different from almost all others, in that it is grown in enormous quantities in one part of the world only, and that is in the very wet lands of the Ganges Delta. The stems

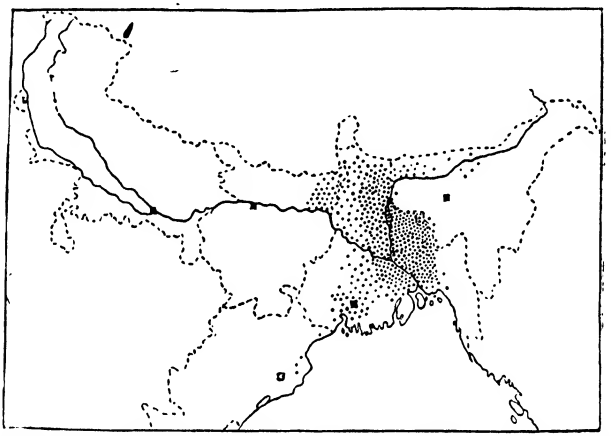


**Fig. 62. Sketch-map showing the distribution of jute**

Each dot means 5,000 acres of jute.

yield a very strong fibre from which most of the sacks in the world are made. Like rice it is a plant of the low, wet lands. Its distribution is shown in Fig. 62.

11. **Oilseeds.**—Plants grown for the sake of the oil obtained from their seeds include linseed, rape, mustard, sesamum and ground-nuts. They grow best with a medium rainfall, and often prefer slightly hilly country. A good proportion of the crop is grown for export.

12. **Coconuts.**—Coconuts are also grown largely for the sake of the oil obtained from their nuts. The dried kernel of the nut, known as copra, is a valuable product and is sent abroad to be manufactured into soap, etc. A useful fibre, called coir, much used for making matting, is obtained from the outer shell of the nuts. Coconuts grow best in wet regions along the coast and

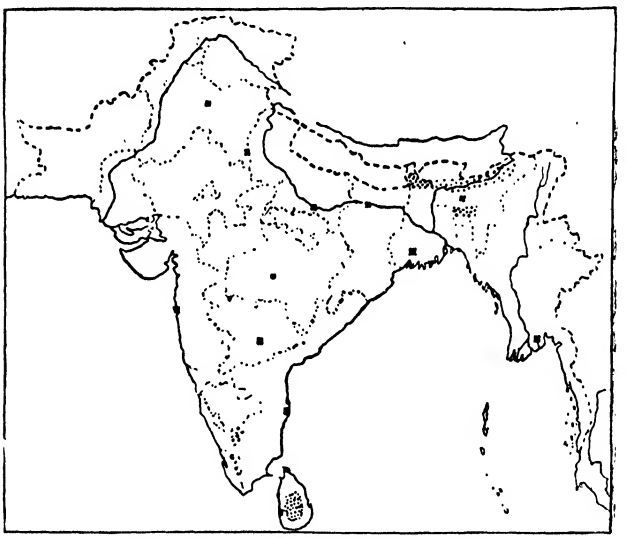
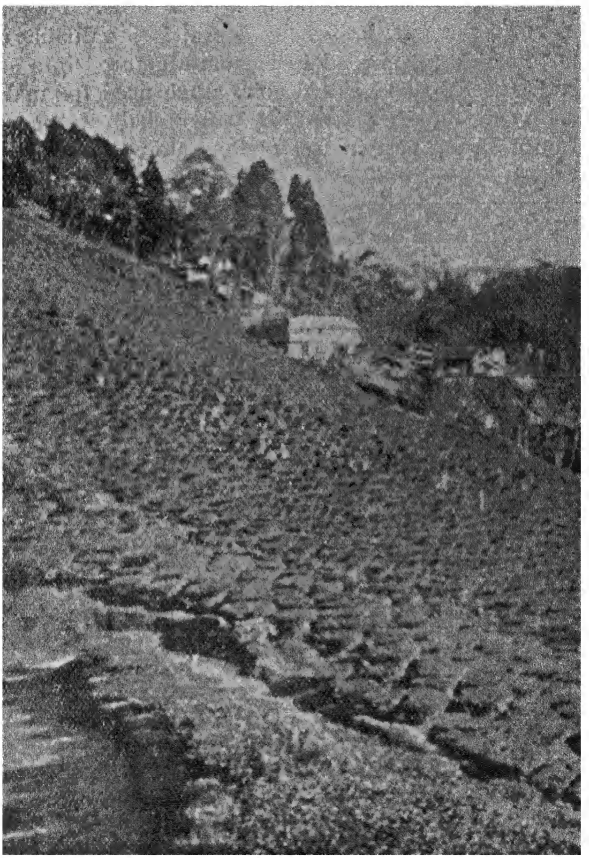


**Fig. 63. The distribution of tea**

Each dot represents 10,000 acres of tea gardens.

are grown down the West Coast, in the island of Ceylon, in the Nicobar and other islands of the Indian Ocean and on parts of the East Coast.

13. **Tea.**—The tea plant is a shrub which requires a heavy rainfall, but must be grown on hill slopes or where the water does not remain near the roots. Most



[*Photo : L. D. Stamp*

**Fig. 64. Tea gardens at Darjeeling**

This photo was taken during January when the bushes were being pruned.

**Fig. 65 A rubber plantation in Ceylon**

of the tea is grown for export. The hill slopes bordering the Brahmaputra Valley in Assam, the Himalayan slopes near Darjeeling and Dehra Dun, the island of Ceylon and the slopes of the Nilgiri Hills are the chief centres (see Fig. 63). Tea is obtained from the dried leaves of the shrub.

14. **Coffee.**—Coffee is obtained from the beans of a shrub. It was once important in Mysore, but a bad disease killed many of the plants, and other countries in the world, like Brazil, can grow coffee more cheaply.

15. **Tobacco.**—Soil is often more important for tobacco than rainfall and a little is grown in most districts of India. In some places, enough is grown to be exported.

16. **Rubber.**—Rubber is made from the juice of a tree which can be grown in very wet regions. The tree is an evergreen and grows best in the evergreen forest regions. There are numerous rubber plantations in Travancore, Ceylon and some in Lower Burma.

17. **Indigo.**—Indigo is a small plant from which a purple dye is made. It used to be important in the Ganges Valley, but it is now possible to make chemical

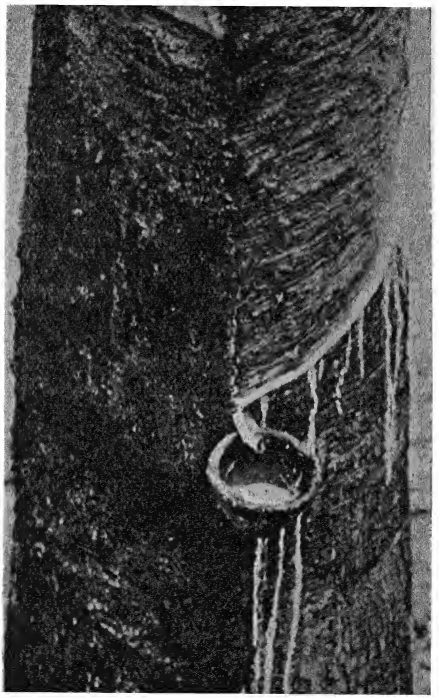


**Fig. 66. The trunk of a rubber tree, showing how the bark is cut to obtain the juice**

dyes more cheaply and the growing of indigo is not nearly so important as it used to be.

18. **Opium.**—Opium is obtained from the seed capsules of the opium poppy. It is smoked by the

Chinese in small pipes instead of tobacco and large quantities used to be sold to China. But it is not good

[*Photo : L. D. Stamp*

**Fig. 67. Cultivation by hand in the rice-fields of Ceylon**

The labourers are turning over the sods before planting the new crop.

for the people and the Government long ago agreed not to sell any more except as a medicine and very little is now grown.

### QUESTIONS AND EXERCISES

1. Using dots of different colours, show the distribution of rice, wheat, millet and cotton in your own province.
2. What parts of the following plants are useful to man :— Cotton, jute, coffee, coconut, rice?
3. Make three lists, one of dry zone crops, one of wet zone crops, one of hill crops.

# CHAPTER X

## THE ANIMALS OF INDIA

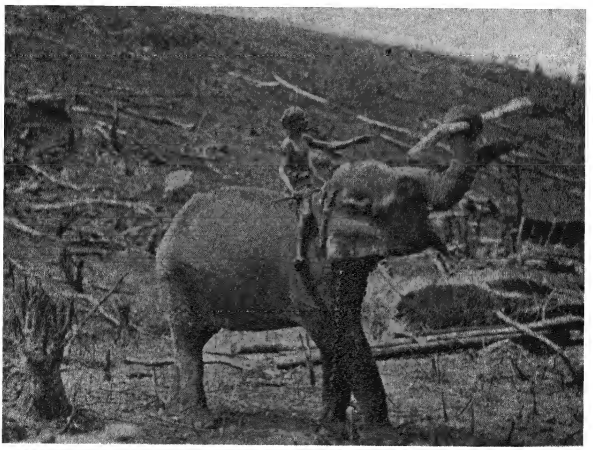
1. **Wild Animals.**—Just as the natural vegetation has disappeared over large areas in India, so the wild animals have disappeared also. We have to go to the mountains, or the thick forests or wild uninhabited lands to find the wild animals. Famous wild animals of India are the tiger and the elephant. Large numbers of elephants live in the wilder parts of the monsoon forests, but it is now mainly in Upper Burma and Ceylon that they are caught and trained. They are caught by being driven into a very strong and narrow enclosure called a Kheddah. The elephant cannot turn round in the narrow kheddah and he charges the end until he is tired out. Then he is tied up with chains and chained to a tame elephant.

There are wild buffaloes and many small animals in most parts of India. Every year many people die from snake bite. In some of the rivers crocodiles are dangerous.

2. **Domestic Animals.**—Man has trained or 'domesticated' a large number of animals to be useful to him. They are not all used for the same purpose. India is an agricultural country and large numbers of buffaloes and oxen are needed to drag the ploughs. Then we must have means of carrying the crops from the fields to the market. For this buffalo-carts and bullock-carts are used. In hilly regions horses, ponies, mules

and donkeys are more useful. In dry sandy regions camels and donkeys are much used.

Then the flesh of animals is eaten in many parts of India. Some eat beef from oxen, mutton from sheep and goats, and pork from pigs. We get milk to drink from cows and goats, and butter can be made from the milk of the cow. The animals also provide us with clothing—wool from sheep, goat's hair from goats and hair from camels—whilst leather is

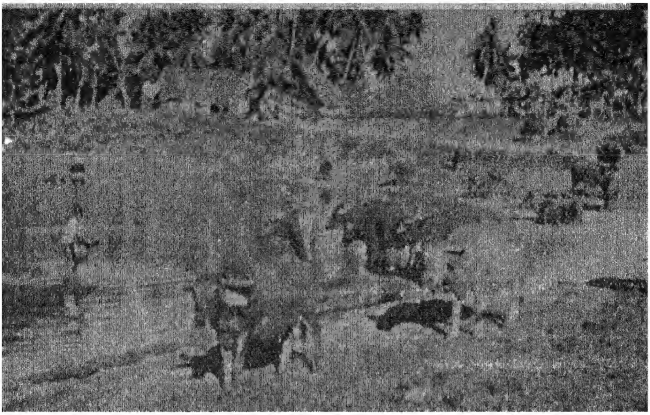


[*Photo: Platé*

**Fig. 68. An elephant clearing jungle for cultivation**

made from the skins of buffaloes, oxen, sheep and goats.

3. **Elephants.**—The elephant is a very intelligent animal and at the same time is very strong. He is most useful in the forests where trees are being cut down for timber. He has been taught to drag great



[*Photo : L. D. S*

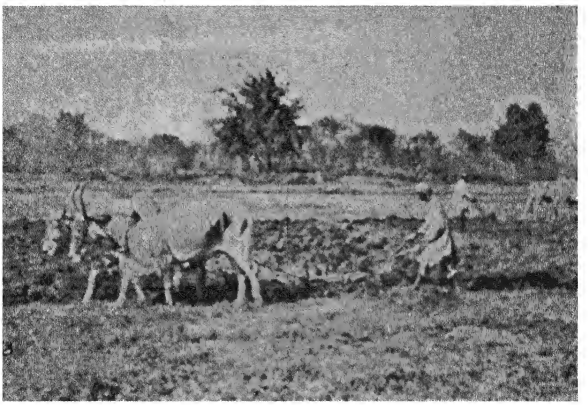
**Fig. 69. Water buffalo, bathing after the day's work (Waltair, Madras Presidency)**

logs of wood, or pick them up in his trunk and carry them and arrange them in neat piles. He is also used as a beast of burden and can travel through thick jungle where there are no roads for bullock-carts. Except during great festivals, elephants are now little used for ordinary journeys.

4. **Oxen.**—Oxen are probably the most useful animals in India. There are enormous numbers of them, because they are used all over India for ploughing and for drawing carts. There is roughly one bull or bullock or cow for every two people. In many countries of the world, where horses or machines are used for ploughing, the bullocks are killed and used for food, whilst the cows are kept for the sake of their milk. The people in India do not use much milk and the bullocks are valued more than the cows. In some parts of India, especially in the United Provinces, good rich fodder is grown and 'dairy farming'—that is the keeping of cows for the sake of their milk—is

carried on. In many of the drier parts of India, there is not sufficient grass to feed the oxen; so fodder has to be grown for them.

5. **Buffaloes.**—There are thirty-one million buffaloes in India. The buffalo is heavier and stronger than the ox but slower. Although the buffalo is very fond of the water and is much used in the rice fields of



[*Photo : L. D. Stamp*

**Fig. 70. Cattle ploughing near Dehra Dun**

wetter regions for ploughing, we also find large numbers in the drier parts of India, as in the United Provinces.

6. **Sheep.**—There are twenty-five million sheep in British India. They live mainly on the dry hilly parts, where they can feed on grassland or waste land which is not good enough for cattle. They are most abundant in Madras. This you will see illustrated in

Fig. 71. Compared with the sheep of other parts of the world, those of India are very poor. They do not give very good wool or meat.

7. **Goats.**—Goats are to be found everywhere in India for they are very easy to keep. They can live on the poorest of grass or shrubs and find enough to eat even in the driest parts.

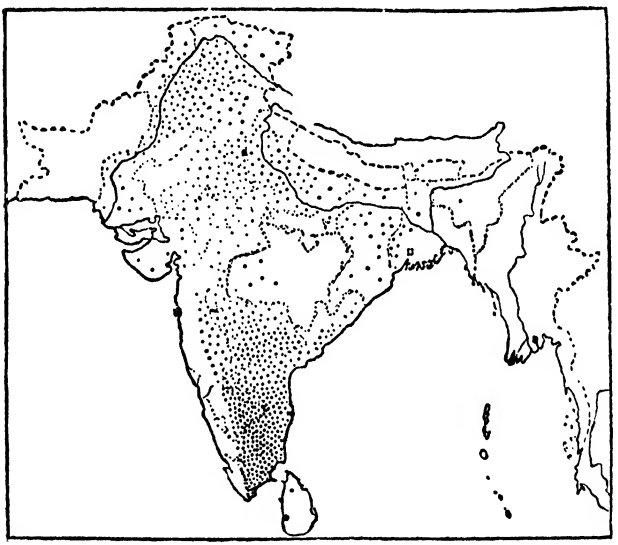


**Fig. 71. The distribution of sheep in India**

Each dot represents 50,000 sheep.

8. **Horses and Ponies.**—There are less than two million horses and ponies in India, which shows you that horses are not used for ploughing as they are in other countries of the world. They are mainly used for drawing small carts.

9. **Mules and Donkeys.**—Mules are very valuable in hilly regions. They are very sure-footed and do not slip on the narrow mountain paths. So goods are strapped on to their backs and carried across the mountains. Donkeys are used in the same way in the drier parts of India and can travel long distances across dry, sandy country.

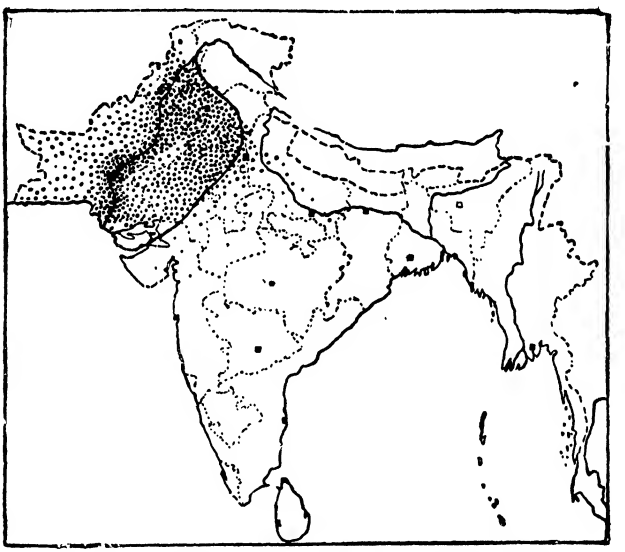
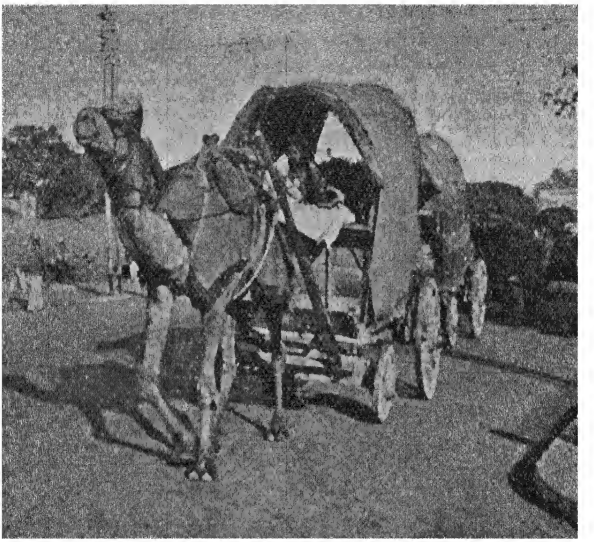


**Fig. 72. The distribution of camels in India**

Each dot represents 1,000 camels. The thick line is the 20-inch rainfall line. Nearly all the camels live where the rainfall is less than 20 inches per year.

10. **Camels.**—The camel is called the 'ship of the desert', because it can travel across deserts, going for long periods without water, and has broad feet which do not sink into the desert sand. So we find there are

many camels in the dry parts but none at all in the wet regions. This is an excellent example of 'Climatic



[*Photo : L. D. Stamp*

**Fig. 73. A camel-cart at Delhi**

Control' in relation to animals. You see this illustrated in Fig. 72.

# CHAPTER XI

## POPULATION

1. **Distribution of Population.**—In the whole of India, there were, in the last census year 1931, about 340,000,000 (three hundred and forty million) people. Now this is a very large number—so large that it is very difficult for us to realize what it means. Suppose you had to make one stroke like this / to represent each person in India and you started now making the strokes as quickly as you could and went on and on day after day and week after week, only stopping for food and sleep, it would take you over five years to make 340,000,000 strokes.

These people are not scattered equally all over India. In some parts there are very few, in other parts there are very large numbers. In other words, some parts of the country are thinly populated, other parts are thickly populated.

We can use a map of India to show where the people live. It would take too long to make 340,000,000 dots and the map would then be too full of dots. So instead we can make one dot for each 100,000 people. On the same map we will mark by a square dot all towns where more than 100,000 people live. This has been done in Fig. 74. Before we try to find out the reasons why people live where they do, there is another word you must learn. When we talk about density of population we mean the number of people who live per square mile of a province or country. Thus, if the area of a province is 1,000 square miles and the

population is 500,000 there are 500 people to every square mile and the density is 500. Again a district of 350 square miles has 4,500 people and if you divide 4,500 by 350 that gives you the density. It is 13.

2. **Reasons for the Distribution of Population.**—In order to discover the reasons why people live where they do in India, let us compare Fig. 72 with other

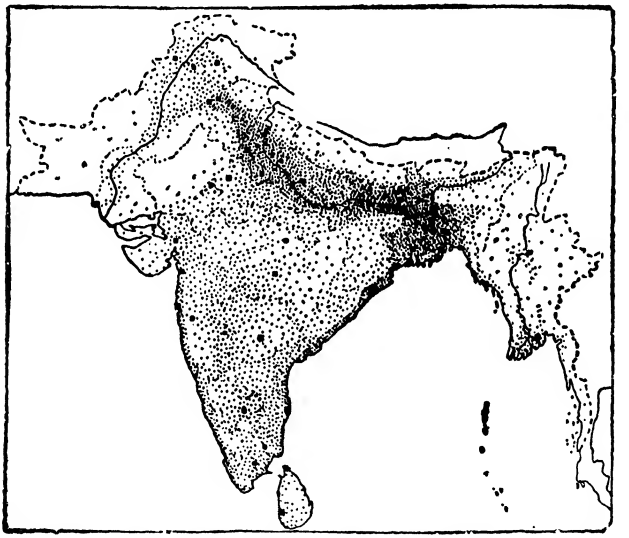


**Fig. 74. The population of India**

Each dot represents 100,000 people. Towns with more than 100,000 people are marked by a square dot.

maps in this book. Firstly, compare Fig. 72 with the physical map of India, Fig 12. Notice that most people live on the lowlands and that very few people live on the high mountains of the Mountain Wall. Now look at Fig. 15, the geological map of India. Nearly all the tracts of alluvium are thickly populated,

for the alluvium affords good rich soil and is easily cultivated. Then compare Fig. 74 with Fig. 41, the rainfall map of India. You will see that the people live both in the very wet regions and in the dry regions, so that man is not controlled by rainfall as much as the natural vegetation and the animals are. Lastly, compare Fig. 74 with Fig. 44 and notice that the population is densest where the artificial vegetation is

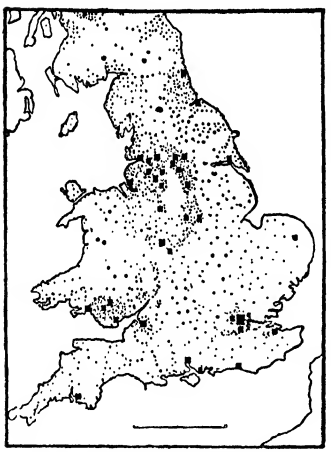


**Fig. 75. Population in England**

Each dot represents 20,000 people; each square dot a town of more than 100,000 people.

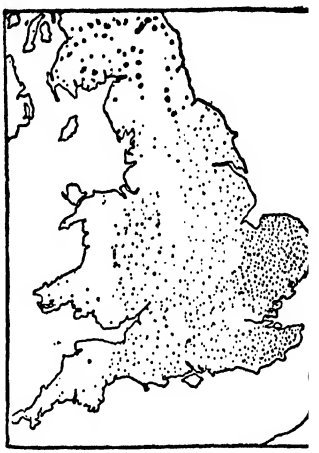


**Fig. 76. Agriculture in England**

greatest. Summarising this, we may say that most people live ,

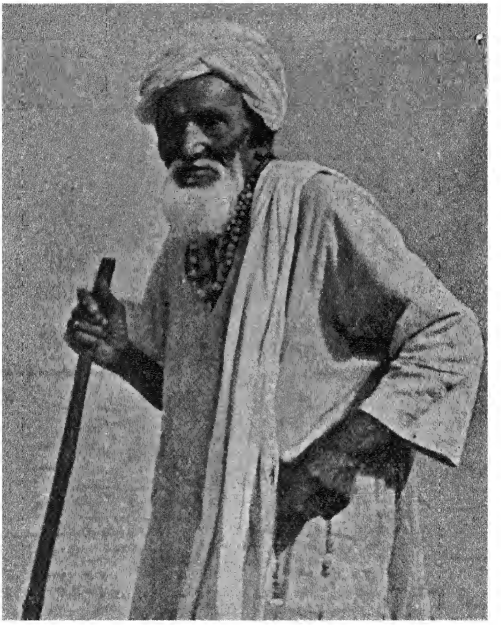
(*a*) in the lowlands or slightly hilly regions;

(*b*) on the tracks of alluvium;

(*c*) both in dry and wet districts; and

(*d*) where the natural vegetation has been removed and cultivated land is shown.

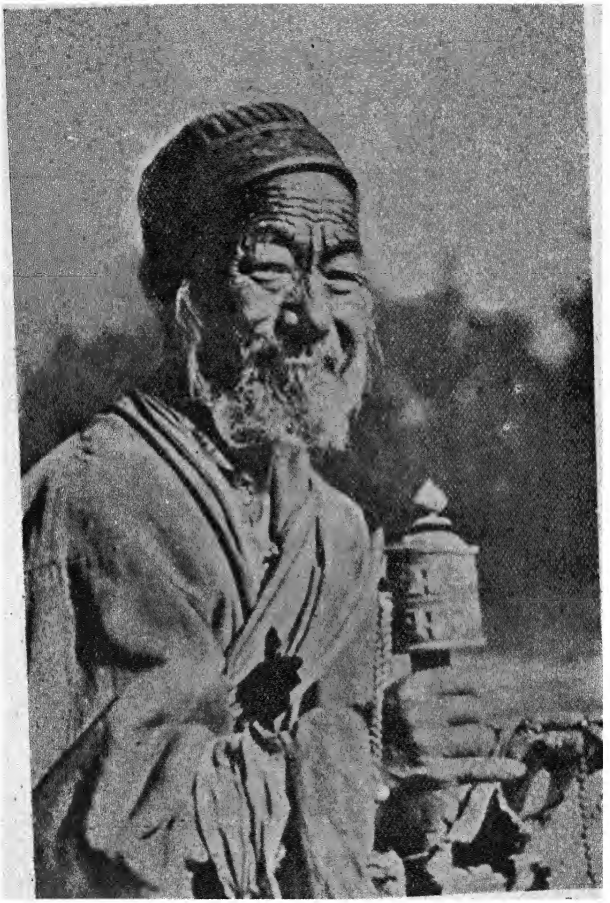
3. **Urban and Rural Population.**—Look again at Fig. 74. Compared with its size there are very few large towns in India. The population is mainly 'rural', that is, the people live in the country near



[*Photo : L. D. Stamp*

**Fig. 77. An Indian of North India**

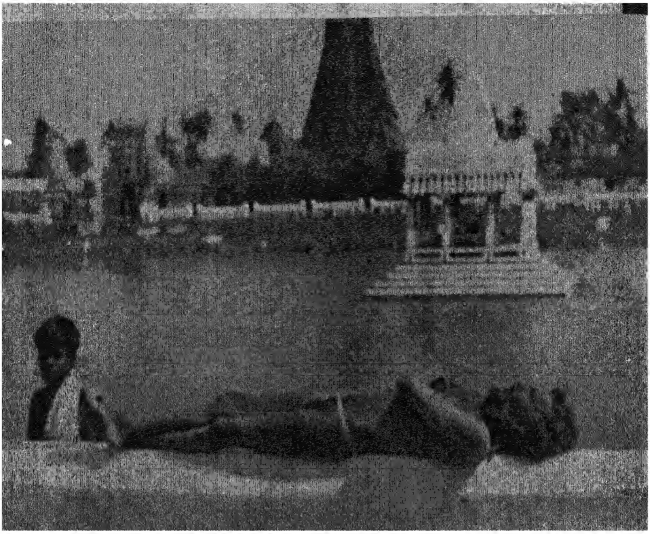
their fields. India is an agricultural country; the population is densest where agriculture is most important. Is this true of all countries? Let us look at the two maps of England and Wales, Figs. 75 and 76, showing the distribution of population and agriculture.



[*Photo : L. D. Stamp*

**Fig. 78. A member of one of the hill people—the Tibetans—of the Himalayas (at Darjeeling)**

These people are more closely allied to the Chinese than to the Indians. This man is a Buddhist priest or lama and he is holding a prayer-wheel.



[*Photo : L. D. Stamp*

**Fig. 79. A Fakir or Holy man**

By a temple tank, Madras.

Notice the large number of big towns. Notice that where agriculture is most important the population is only small. In other words, England is exactly the opposite of India. That is because England is an industrial country and most of the people are engaged in industry, in manufactures which are carried on in the big towns. The population is mainly 'urban'. We can really group the countries of the world roughly into two groups: —

(*a*) Agricultural countries, engaged in the production of food and raw materials.

(*b*) Industrial countries, engaged in the manufacture of goods.

In order that agricultural people may live comfortably, they must buy manufactured goods from the industrial people; in order that industrial people may

live, they must buy food from the agricultural people. So we find there is a big exchange between agricultural and industrial countries such as India and England for the benefit of both countries; an exchange of food grains and raw materials for manufactured goods. Then there is also an exchange between the different parts of one country—between the industrial towns and the country villages. Thus India has great modern industrial cities such as Bombay and Calcutta which need food from the country.

4. **The Races of People in India.**—The distribution of the different races of people in India is a result of the complicated history of the country.

Ages and ages ago the only people living in India were very wild uncivilized peoples, whom we call the Pre-Dravidian peoples. Then India was invaded by cleverer people whom we may call the Dravidians. They spread all over India and drove the wild inhabitants away to the hills and thick forests. There are scarcely any descendants of the Pre-Dravidians left now; the best examples are the Veddas who live in the forests in the wildest parts of Ceylon. After the Dravidians India was invaded again and again from the north-west by clever, cultured and educated peoples. The invaders—we may call them all together the Indo-Europeans or Indo-Aryan peoples—took possession of all the best lands, such as the fertile plain of northern India, and drove the Dravidians into Peninsular India, south of the Satpura line. The Satpura range of mountains formed one of the great barriers which prevented the spread of the invaders to the south.

Wave after wave of different races poured into India and settled there, often intermarrying with the people they conquered, so that to-day the peoples of India are

very mixed and it is often difficult to say whether they have descended from the Dravidians or from the later invaders. It is much easier to classify the people according to the language they speak, or according to their religion.

5. **The Languages of India.**—The large number of languages spoken in India is also a result of the history of the country. We can distinguish four main groups.

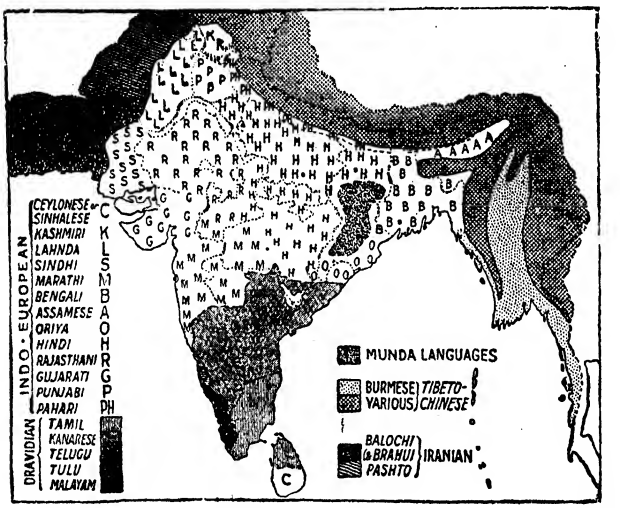



**Fig. 80. Map showing distribution of languages**

(*a*) The Munda languages probably represent the languages spoken by the oldest or Pre-Dravidian inhabitants of India. The languages are very curious —long words are made by stringing together a number of short ones, so that one long word often means as

much as a long sentence with us. Munda languages are only spoken by a few of the wildest of the hill

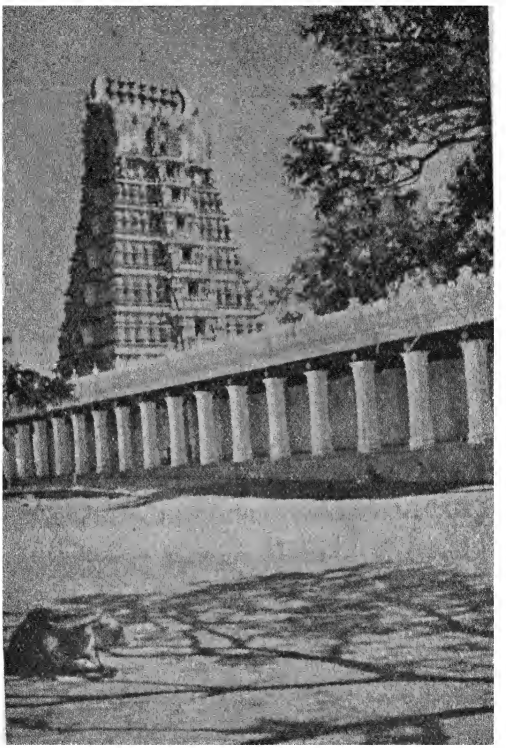


*Photo : L. D. Stamp*

**Fig. 81. A typical South Indian Temple and Temple Tank, Madras**

tribes who live in the thick forests of the Chota Nagpur Plateau.

**Fig. 82. A Processional or Holy Cart, Bombay**

(*b*) The Dravidian languages, once spoken over most of India, are now confined to the Peninsula (see Fig. 80). The principal ones are Tamil, Telugu, Malayalam, Kanarese and Tulu.

(*c*) The Indo-European languages, which were introduced by the conquerors who came from the north-west. They have spread all over Northern India and a long way down into the Peninsula. There are very numerous different ones. In Baluchistan and the hills nearest the original home of the languages we find Baluchi, Pashto and Brahui (not now spoken by many people). Going south-eastwards are Sindhi, Gujarati and Marathi with Rajasthani further north; going north-eastwards are Lahnda, Pahari, Panjabi, Kashmiri, Western and Eastern Hindi, Bihari, Oriya, Bengali and Assamese.

[*Photo : L. D. Stamp*

(a) (b)

**Figs. 83-4. The cow, the sacred animal of the Hindus**

(a) alive being allowed to wander in the busy streets of Calcutta; (b) represented in stone, Chamundi Hill, Mysore.

(*d*) The Tibeto-Chinese languages, which again are quite different and are the languages of the Mongol peoples. Different languages of this group are spoken by the hill tribes of the Himalayas such as the Lepchas, and also over most of Burma where the principal language is Burmese.

6. **Linguae Francae.**—When so many different languages are spoken in a country, it is very difficult for people when travelling about to understand one another. It is the same when people travel from one country to another. In order that people may understand one another, there are a number of 'Common languages' or 'linguæ francæ' which are spoken or understood by people although it is not their own language. The most important of all is English, which is spoken or understood over more than half the world. It is understood by educated people throughout India.

Over the whole of Northern India and parts of Burma the common language, used in nearly all the bazaars, is Hindustani. It is really an impure form of Hindi. Muslims in most parts of India understand Urdu, which is almost the same as Hindi, though written in a different way. In Southern India and Ceylon the *lingua franca* is Tamil.

7. **Religion.**—More important than race or even language is Religion. In India the lives of the people are often entirely controlled by religion. It determines their upbringing, education, customs and habits, marriage, occupations, dwelling place, type of home and architecture of towns. Here are just a few examples of the varying influence of religion. To the Hindus the cow is a sacred animal and they will not eat beef; to the Muslims the pig is an unclean animal and they will not eat pork. It is forbidden for a Buddhist to take life and he will not kill an animal for food. Early marriage is the custom amongst certain Hindus and nearly all the girls are married before they are ten years old in certain parts of India.

In some parts of India the 'purdah' system is observed, and in Bengal the people do not live in villages but in isolated huts so that the women shall not see one another. Wherever Muslims are found, their mosques with the characteristic form of architecture are found also.

We find in India that there are 'religious centres', famous places of pilgrimage or seats of learning connected with one of the religions. Thus Benares with its thousands of Hindu temples and its Hindu colleges is a centre of both the Hindu religion and the culture connected with it. Lahore is a great centre of Mohammedanism, whilst Rangoon and Mandalay in Burma and Kandy in Ceylon are centres of Buddhism. To the Hindus the River Ganges is the most sacred river in the world, to die or to be cremated on its banks is to gain everlasting peace. Hardwar, where the Ganges leaves the mountains, is one of the most sacred places of pilgrimage.

8. **Distribution of Religions and Cultures.**—The principal religious sects of India are:—

| | | | |
|---|---|---|---|
| (*a*) Hindus | ... | 239,195,000 | 70·7 per cent |
| (*b*) Sikhs | ... | 4,336,000 | 1·3 „ |
| (*c*) Jains | ... | 1,252,000 | ·4 „ |
| (*d*) Parsis | ... | 110,000 | ·04 „ |
| (*e*) Muslims | | 77,678,000 | 22·8 „ |
| (*f*) Christians | ... | 6,297,000 | 1·9 „ |
| (*g*) Animists | ... | 8,280,000 | 2·5 „ |

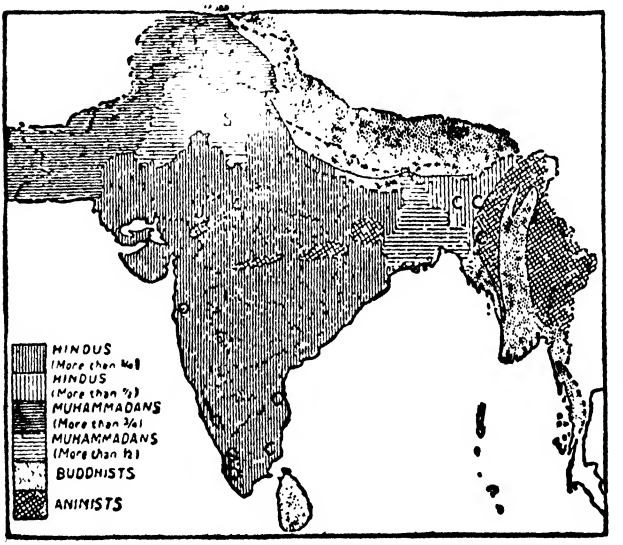



**Fig. 85. Map showing distribution of religions**

C, many Christians; P, Parsi; S, Sikh; J, Jain.

Many of the hill tribes, the backward peoples, are Animists, that is, they worship spirits which they say live in the trees, or the rocks, etc. The Sikhs, Jains

and Parsis are grouped round what we may call 'cultural centres'. The Sikhs are mainly in the Punjab; the Jains in Rajputana and neighbouring parts of Bombay; the Parsis in Bombay.

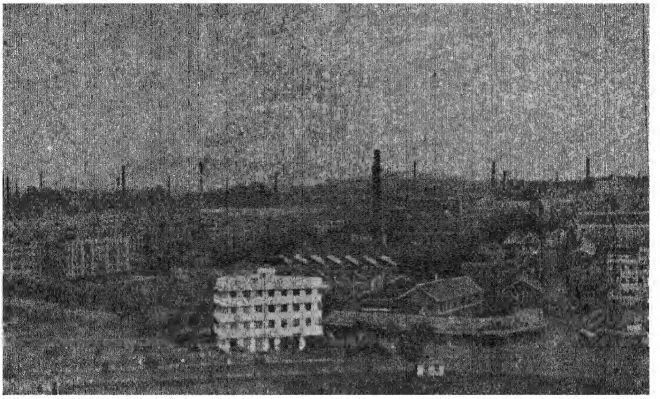
The two greatest religions of all—Hinduism which may be called the natural religion of India, and Mohammedanism—are widely distributed. Mohammedanism came to India with the later invaders from the north-west and so we find it predominates in Baluchistan, North-West Frontier, Kashmir and the Punjab. There is another strong centre of Mohammedanism in Bengal and amongst the people of Hyderabad. Hinduism predominates in other parts of India. Christianity was brought by seafaring peoples and is strongest near the coasts.

Again we notice the geographical control of the spread of religions. Mohammedanism followed along the Northern Plain but did not penetrate so strongly in Peninsular India. Jainism and the Rajput culture, as well as the Rajasthani language stop short at the Satpura Mountains. Fig. 85 shows the distribution of religions.

9. **Occupations.**—India is mainly an agricultural country. Fig. 86 shows the relative importance of

**Fig. 86. Occupations of the people in India**

occupations other than agriculture. Although India has always been an agricultural country, it has always been noted for the cleverness and skill of its people in



[*Photo : L. D. Stamp*

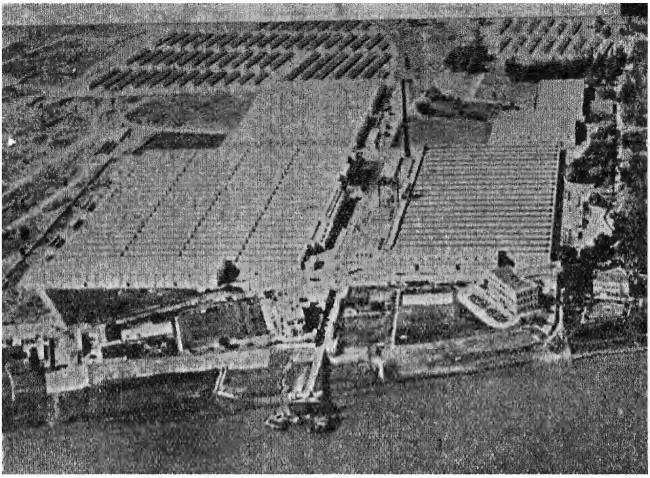
**Fig. 87. View over the industrial north of Bombay showing the smoking chimneys of the cotton mills and the blocks of dwellings for the workers**

making cloth and silk, working in metal and ivory and wood. Machine-made articles can be produced so much more cheaply than the hand-made articles and India is fast taking her place in the world as a manufacturing country as well as an agricultural country. We can still distinguish

(*a*) the old native industries of hand-made articles;

(*b*) the new factory industries of machine-made articles.

10. **Manufactures of India.**—(*a*) *Cotton Goods.*—The most important native industry has always been the weaving of cotton fabrics. Cotton is one of the native plants of India and though enormous quantities are produced for export, nearly half is used in the country. In some parts of India almost every house has its hand-loom where the women make their saris or dhotis for the men. More important now are the great cotton factories. The most important cotton manufacturing

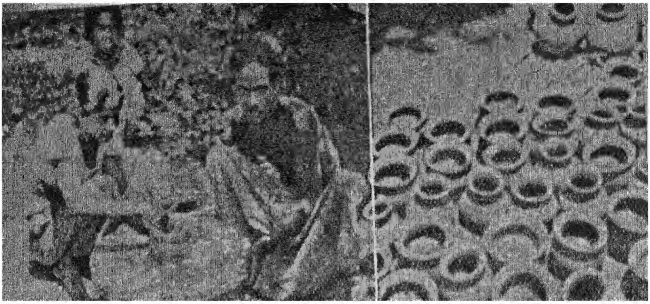


[*Photo : Indian Air Survey Co. Ltd.*

**Fig. 88. Air view of a large jute mill on the River Hugli, near Calcutta**

centre is Bombay where a quarter of a million people are employed in the cotton mills. There are also mills in the Madras Presidency and in the Central Provinces. For the manufacture of cotton goods a certain amount of moisture in the air is required. Bombay has this right amount of moisture, Karachi has not. So that although Bombay and Karachi are both ports exporting raw cotton, only Bombay has in addition cotton mills.

(*b*) *Jute.*—Just as Bombay is the centre of the cotton manufacturing industries, so Calcutta is the centre of the jute mills. Jute, as we have seen, is grown in the Ganges Delta. A large quantity is exported raw, but the mills round Calcutta and up the River Hugli make large quantities of jute canvas and 'gunny bags'—that is, sacks in which paddy and other grain are packed for transport.



[Photo : L. D. Stamp

**Figs. 89-90. The village potter and his family (near Negombo, Ceylon)**

(*c*) *Silk.*—India has long been famous for its beautiful silk, and many of the fine old towns are still noted for special kinds. But the industry is very small when compared with cotton or jute. Much of the raw silk is imported from China, but native Indian silk is also produced. Bengal is the chief silk producing province. Brocaded silk goods are made in Bengal, the Punjab and Southern India; striped silks and the famous gold brocades all over Northern India at such centres as Agra, Benares, Amritsar, Ahmedabad and Surat.

(*d*) *Woollen Goods.*—India has also long been celebrated for woollen goods, especially carpets and shawls. The weaving of shawls is a typical industry of Kashmir. Carpet-making is carried on in many parts of India, but especially in the Punjab, Kashmir and in the Central Provinces. Coarse blankets are made in many parts of Northern India where the winters are cold.

In the cotton, silk and woollen industries native vegetable dyes such as indigo were once used, but now cheap artificial dyes are imported.

(*e*) *Metal Working.*—The smelting and working of iron is another old industry of India, and the great

Tata Iron and Steel Works, on the north-eastern coal-fields, are the chief large modern iron works. Many castes in India use brass for all cooking utensils and brass working is an important industry in many towns of Northern India, as Benares, Bombay and Poona are centres of silver working, Jaipur and Delhi of gold working.

(*f*) *Pottery.*—The making of pottery for domestic purposes is a cottage industry everywhere in India. Bricks and tiles are made all over Northern India.

(*g*) *Other Manufactures.*—There are numerous wheat flour mills in the Punjab; saw-mills in Assam; oil refineries in Assam and the Punjab; tobacco factories in Madras, etc. The manufacture of sugar is spreading rapidly. In 1934 there were 130 sugar factories, compared with 30 in 1931. Most of them are in the United Provinces and Bihar. India is trying to grow more sugar, so as to avoid the necessity of importing from Java. In Travancore the rubber industry is important, and tea packing in Assam and in the Nilgiri Hills.

# CHAPTER XII

## THE POLITICAL DIVISIONS OF INDIA

**1. Government of India.**—Until the 15th of August 1947 the great Indian Empire was ruled by the Government of India, at the head of which was the Viceroy or Governor-General. The Viceroy was assisted by a small council, so that the acts of the Government of India were always said to be by order of 'The Governor-General in Council'. The Viceroy and Council were advised in all matters by the Legislative Assembly, a large body of men elected mainly by the Legislative Assemblies of the Provinces. The Legislative Assembly was mainly responsible for the making of laws. Although the Government of India with its Council and Legislative Assembly was the real means of Government in India, many matters had to be referred to the Capital of the British Empire, London, where they were administered by the Secretary of State for India. A great part of India used to be controlled by the East India Company. When the possessions of that Company were taken over by the Crown and the Government of India was formed, the proclamation declared that 'all shall alike enjoy the equal and impartial protection of the law' whatever their race or religion and that all offices in the Government should be open to Indians, whatever their race or creed, education, ability and integrity being the only qualifications required. The constitution of India was considerably changed in 1937 as a result of the Government of India Act of 1935.

Early in 1947, the British Parliament passed an act dividing British India into two Dominions—The Indian Union with its capital at Delhi and Pakistan with its capital at Karachi—which came into being in August,

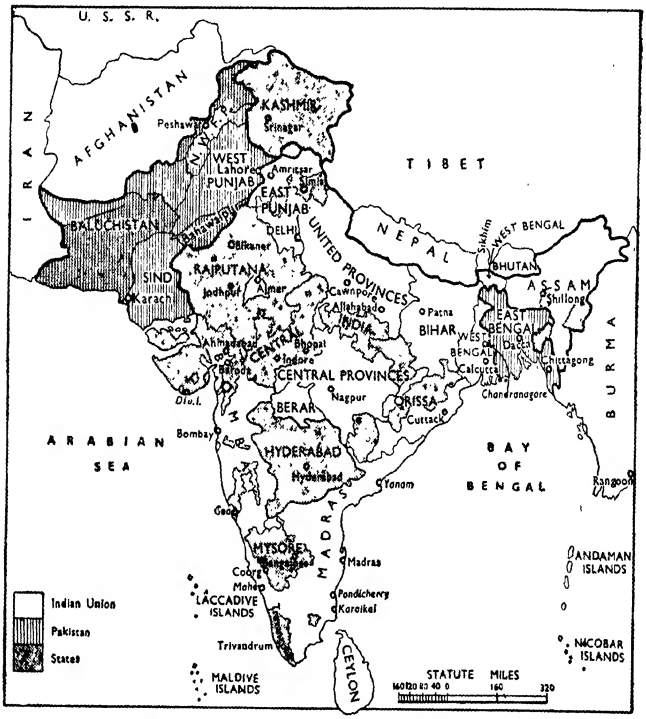



**Fig. 91. A political map of India**

1947. As a result of this, the Punjab has been divided into West Punjab and East Punjab, and Bengal into West Bengal and East Bengal. Each Dominion has a Governor-General, a Prime Minister, a Cabinet and a Constituent Assembly.

**2. Provinces.**—It would be very difficult to govern a large area from one centre such as Delhi or Karachi. So both the Dominions remain divided into several major and minor Provinces.

The Indian Dominion comprises the nine major provinces of Madras, Bombay, United Provinces, West Bengal, Bihar, Orissa, Assam, East Punjab and Central Provinces, each having a Governor, a Council of Ministers, a Legislative Council and an Assembly; and four minor provinces—Ajmer, Delhi, Coorg and the Andaman Islands, each administered by a Chief Commissioner.

The Pakistan Dominion comprises the four major provinces of Sind, West Punjab, North West Frontier Province, and East Bengal, each having a Governor, a Council of Ministers, a Legislative Council and an Assembly, and the minor province of Baluchistan administered by a Chief Commissioner.

3. **Indian States.**—Then there are large areas of India, called Indian States, ruled directly by their own hereditary chiefs (styled Maharajas, Rajahs, etc.). Some of these States are very large, like Hyderabad or Mysore, others embrace only a few square miles.

Most of the States have acceded to either the Indian Union or Pakistan. In all these cases the Dominion Government exercises control over such external subjects as foreign affairs, communications, etc. but the rulers have complete control of the internal affairs of their States.

Some States have political relationships with the Province in which they lie but the larger states and a few of the smaller ones deal directly with the Central Government.

Included geographically in India are certain entirely independent States like Nepal.

4. **Ceylon.**—Quite separate in Government is Ceylon, which forms an island off the south of India and only separated from it by a narrow strait. It was one of the 'Crown Colonies' of the British Empire, ruled by a Governor, a small Executive Council and a Legislative Council elected by the people. From February 1948 it has become a Dominion.

5. **Burma.**—Until 1937 Burma was one of the major provinces of India. In that year it was separated from India and became a separate country with a government of its own. Since the 5th of January 1948 Burma is a Republic under the British Empire.

6. **The French Possessions.**—These possessions consist of various ports and small tracts of land scattered round the coast of India. Pondicherry is the capital. Others are Mahé, Karikal, Yanaon and Chandranagar. They are ruled by a French Governor and send two representatives to the French Parliament in Paris.

7. **The Portuguese Possessions.**—These possessions consist of various ports round the coast. The largest tract of land is Goa. Others are Diu Island and Daman.

# CHAPTER XIII

## THE NATURAL REGIONS OF INDIA

1. **Political and Natural Divisions.**—In the last chapter we learnt that India is divided up into a number of Provinces and Indian States. These are 'political' divisions which have been made by men. Throughout history the political divisions of countries have been frequently changed. This may happen even in times of peace. For example, in 1912 the Capital of India was moved from Calcutta to Delhi and a portion of the Province of the Punjab was cut off to form a district round Delhi. In 1905, in 1912 and again in 1935-37 Government completely altered several of its provinces. Before 1937 Sind formed part of Bombay Presidency whilst Bihar and Orissa formed one province.

But we have learnt in this book of many features which cannot be changed:—The position of the mountains, plains and plateaus; the geology and soils; and the climate, especially the rainfall. We have seen how these natural features control the vegetation, the agriculture and the distribution of man. In studying the geography it is often better, then, if we divide the country up into regions based on natural features. These must always remain the same, however much the political boundarise may change.

2. **Natural Regions.**—A natural region is not one which has remained untouched by man. There are natural regions where man has done very little to alter the nature of the country, but there are other natural

regions, like the Ganges Delta or the Punjab Plains, where man has done a great deal to alter the country.

In the maps in this book you will find that the natural regions have been marked off by lines. In some cases it is possible to say very closely where one natural division ends and another begins. For example, where the Salt Range rises from the Punjab Plains is the dividing line between two regions. It is very clear. Again, the crest of the Western Ghats has been used to separate the West Coast Region from the Deccan Regions. It is a definite line. But in other cases it is not so, and it is difficult to say where one region ends and another begins. One region fades gradually into another. Thus the Rajput Uplands slope down gently from the Aravalli Range, become drier and fade gradually into the Thar Desert. It follows, therefore, that although the map may show a line separating two natural regions, it may actually be very difficult to say where the dividing line should be drawn.

As far as possible, a natural region should be a division of a country, having the same physical features throughout (mountainous, hilly, plateau or plain), possibly the same geological structure (old hard rocks, folded mountains, alluvium, etc.) and the same climate throughout. As a result, the natural vegetation and the agriculture through the whole region are the same, whilst quite often the region is inhabited by one race of men, speaking the same language and having the same customs. In the latter case the natural geographical region is also a 'cultural region'.

It must often happen that the regions into which we can divide a country are not ideal regions. A region may vary a little from one part to another; it may be wetter at one end than at the other; or it may change

gradually from a plateau at one end to a plain at the other.

In dividing a country into its natural regions, we must try to take *all* the natural features into consideration and not only some of them. Sometimes one is more important than another.

3. **Natural Regions of India.—Groups.**—India is a very large country and we have to divide it into a large number of natural regions. In Chapter III of this book we noticed that the country falls into four or five great physical divisions. It will be simpler if we group together the natural regions according to these physical divisions which we talked about in Chapter II: This gives us the following arrangement:—

(*a*) Natural Regions of the Mountain Wall.
(*b*) Natural Regions of the Great Plain.
(*c*) Natural Regions of the Indian Plateau.
(*d*) Natural Regions of Ceylon.

4. **The Natural Regions of the Mountain Wall.**—These Natural regions have one thing in common. They are all mountainous, are very hilly, or consist of high plateaus surrounded by mountains. Perhaps you will say, why does not the Mountain Wall form only *one* natural region? One answer is because the climate varies enormously from end to end. One place in Assam near the eastern end has the heaviest rainfall in the world; some places near the western end have practically no rain at all. Further, the higher parts are much colder and different therefore from the lower parts. We usually find that a physical region must be further divided according to climate.

We therefore divide the Mountain Wall into the following regions: —

(1) The Eastern Hills Region—comprising the eastern part of the Mountain Wall, separating India

from Burma. It is very wet, forested and thinly populated.

(2) The Himalayan Region---comprising the Himalayan Mountain Chain from 5,000 feet upwards.

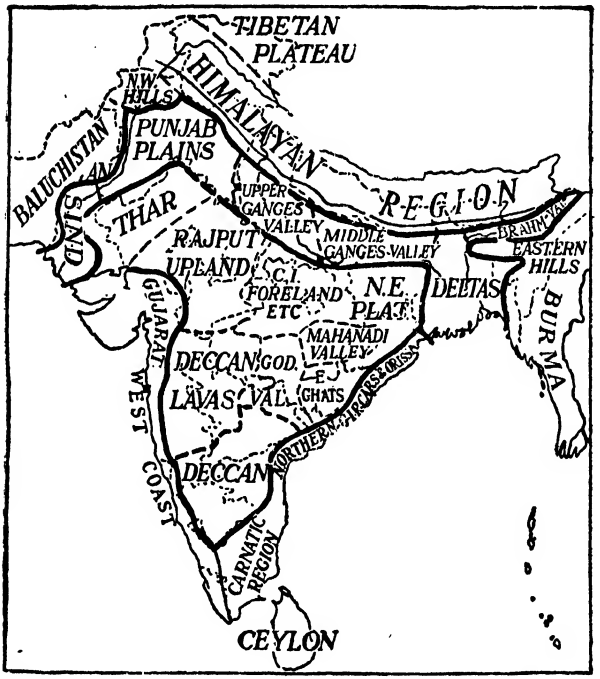



**Fig. 92. Natural regions of India**

(3) The Sub-Himalayan Region—comprising the foothills between the plains and the mountains as well as the lower slopes of the Himalayas up to 5,000 feet.

(4) The Tibetan Plateau—on the far side of the Himalaya Mountains. It is the highest plateau in the

world, away from the reach of the monsoon and is an Alpine desert.

(5) The North-Western Dry Hills—the north-western area of the Mountain Wall, a very dry region.

(6) The Baluchistan Plateau—the western part of the Mountain Wall, a very dry plateau surrounded by hills.

5. **The Natural Regions of the Great Plain.**—The great alluvial plain of Northern India is again divisible according to climate.

(7) The Lower Indus Valley or Sind—a very dry alluvial plain, depending almost entirely on irrigation water from the River Indus.

(8) The Punjab Plain—another very dry alluvial plain, depending almost entirely on canals from the five rivers of the Punjab.

(9) The Upper Ganges Valley—a dry region in which nearly half the country depends on perennial irrigation canals from the Jumna and the Ganges.

(10) The Middle Ganges Valley—an intermediate area, with a mixture of wet zone and dry zone crops.

(11) The Lower Ganges Valley or the Deltas—a wet alluvial region characterized by wet crops, notably rice.

(12) The Brahmaputra Valley—a wet valley, much narrower than the Ganges Plains and less thickly populated.

6. **The Natural Regions of the Indian Plateau.**—The whole of India south of the Hindustan Plain may be called the Indian Plateau. We might call it Peninsular India but most people, when they use that term, mean only the land south of the Satpura Range. We

may distinguish ten natural regions grouped as follows:—

(*a*) Coastal Regions round the Plateau proper.—

(13) The Gujarat Region—dry or moderately dry, hilly in places.

(14) The West Coast Region—Comprises a narrow coastal plain and the slopes of the Western Ghats; very wet.

(15) The Carnatic or Tamil Region—comprises a broad coastal plain and an inland hilly part; moderately wet, with the rain falling mainly in October, November and December.

(16) The Northern Circars Region, including Orissa—a coastal plain moderately wet.

(*b*) Regions north of the Satpura Mountain Line and sloping down towards the Hindustan Plain.—

(17) The Thar or Great Indian Desert.

(18) The Rajput Upland Region—dry to very dry, hilly, sloping upwards from the Thar and Punjab Plains towards the Satpura Range.

(19) The Central Indian Foreland or Central India Plateau—dry, sloping upwards from the Ganges Plain to the Central India Highlands.

(*c*) Regions of the Plateau (Peninsular India proper).—

(20) The Deccan or high southern part of the Plateau—dry, somewhat barren and thinly populated.

(21) The Deccan Lavas Region or north-western part of the Plateau—dry but with a very fertile black soil, very suited for cotton, moderately thickly populated.

(22) The North-Eastern Plateau—a complex region comprising five sub-divisions—the Central Indian Highlands, Chota Nagpur Plateau, Eastern Ghats, Chhattisgarh Plain or Mahanadi Valley and the

Godavari Valley. The region, as a whole, has a moderate rainfall (40 to 60 inches) and is thinly peopled and largely forested. The people live mainly in the two valley areas.

7. **The Natural Regions of Ceylon.**—Ceylon is influenced by both the South-West and the North-East Monsoons and so its climate varies very greatly from one part to another. Properly Ceylon should be divided into a large number of small regions, but it is possible to distinguish three main ones:—

(23) The Central Hills of Ceylon—a hilly region consisting of old hard rocks and enjoying a good rainfall.

(24) The Coastal Plains—flat, but varying greatly in rainfall from one part to another, but with an equable temparature.

(25) The Northern Limestone Plain—flat, rather dry and with a poor soil.

8. **The Natural Regions of Burma.**—These will be considered later.

## QUESTIONS AND EXERCISES

1. What is a natural region?

2. Why is it often better to use natural regions in studying the geography of a country than to use political divisions?

3. Construct a table to show at a glance the differences between the natural regions of India. Mark the regions one under the other and opposite draw 10 columns; one each for physical features, geology, temperature, wind, rainfall, natural vegetation, agriculture, density of population, language, religion.

# CHAPTER XIV

## ASSAM

### THE PROVINCE

Assam has been a separate province since 1912. Its population is only 10¼ millions, and there is still plenty of room for more people in many parts of Assam. It is ruled by a Governer with a Legislative Council. The seat of Government is Shillong, on the high healthy plateau but not served by a railway.

**Physical Features.**—Assam falls into four separate divisions: —

(A) The Brahmaputra Valley along the north.

(B) The Hills Region consisting of the hills which separate Assam from Burma.

(C) The Assam Plateau, a broad finger extending westwards from the eastern hill and formed by the Khasi, Jaintia and Garo Hills.

(D) The Surma Valley in the south, which joins on to, and really forms part of, the great Delta Region of Bengal.

Along the north of Assam lie the Himalaya Mountains and certain tracts (the Balipara Frontier tract and Sadiya Frontier tract) of Assam, as well as the neighbouring State of Bhutan, form part of the mountain region.

The first three physical regions form natural regions which lie wholly within the province and we will describe them in detail, but the Surma Valley will be described later with Bengal.

## A. The Brahmaputra Valley

1. **General Features.**—The Brahmaputra or Assam Valley is very different from the broad alluvial plains of the Ganges Valley. On the north side the lower slopes of the Himalaya Mountains are not far away, on the south side the slopes of the Assam Hills—the Garo, Khasi and Jaintia Hills—approach close to the river. Much of the flat land in the Brahmaputra

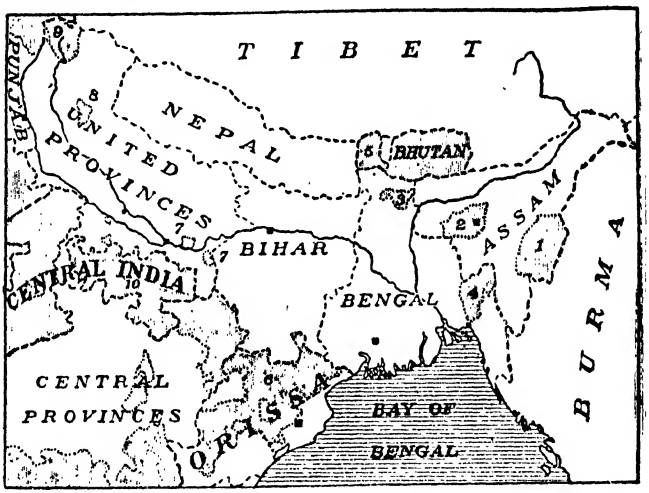



**Fig. 93. Political divisions of North-Eastern India**

Native States dotted. 1, Manipur; 2, Khasi and Jaintia Hills; 3, Cooch Behar; 4, Hill Tippera; 5, Sikkim; 6, Orissa States; 7, Benares State; 8, Rampur; 9, Garhwal; 10, Central India.

Valley is used for rice growing; on the gentle slopes are the tea-gardens for which Assam is famous.

The River Brahmaputra rises in the plateau of Tibet and flows for a very long distance eastwards before breaking through the northern Mountain Wall into Assam. The Brahmaputra Valley in Assam is roughly

500 miles long, but only about 50 miles wide. The river itself is broad, it divides and reunites again many times. On either side there is often a waste marshy belt, but a little distance from the river are flat lands given over to rice growing. Palm trees and villages are dotted about amongst the paddy fields; further away from the river are found the gentle slopes covered with tea-gardens. The Brahmaputra receives many tributaries from either side, but none of them is important.

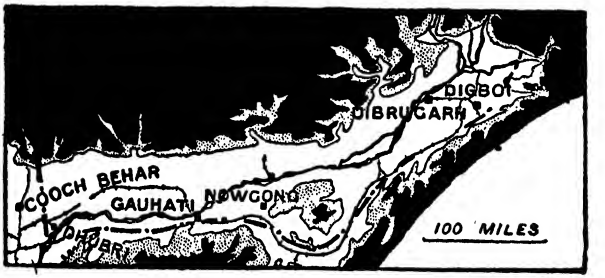



**Fig. 94. The Brahmaputra Valley**

Notice the long narrow valley between the great mass of the Himalaya Mountains on the north and the Eastern Hills Region on the south and south-east.

2. **Climate.**—Look now at Fig. 41, the Rainfall Map, and notice that a great part of the Assam Valley has a good rainfall of more than 80 inches, but in the centre there is a large oval patch where the rainfall is less than 80 inches. This is because part of the Brahmaputra Valley lies in the 'Rain-Shadow' of the Garo, Khasi and Jaintia Hills. Notice how these hills shelter the valley from the South-West monsoon. The Brahmaputra Valley is further north than the great plains of the Deltas Region and so is colder in the cold season (Fig. 20). In the Hot Season and the

Rains, the sky is cloudy and so the land does not get so hot and dry as it does in the broad Upper Ganges Valley.

3. **People.**—Fig. 95 shows that a considerable part of the Brahmaputra Valley is cultivated. Near the great Ganges Plain (that is, the Deltas Region or North Bengal) in the western districts of Goalpara and Kamrup, the population is densest and more land is cultivated than at the eastern end of the plain. But Fig. 95 shows that there is still a large amount of waste land which might be cultivated. There are still

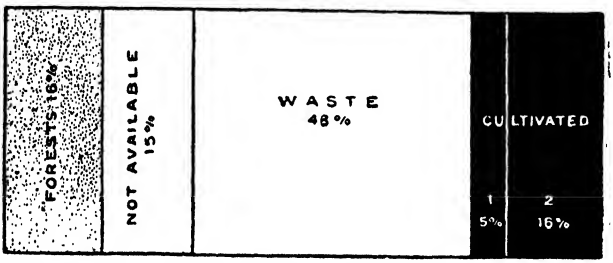



**Fig. 95. Proportion of cultivated land in the Brahmaputra Valley**

Cultivated land:—1, 'fallow'; 2, 'sown'.

only 150 people to the square mile, instead of 500 or more in each square mile of the Ganges Valley or Delta Districts. Every year large numbers of Biharis and Bengalis come from the more crowded parts of Eastern Bengal and settle in Assam. Nepalis come from the Himalayas and find in the Assam Valley more fertile land. There are large numbers of Biharis employed in the tea-gardens and every year many of them give up work in the tea-gardens and settle down to cultivate the waste land of the Brahmaputra Valley and more Biharis come from Bihar and Orissa to take

their places in the tea-gardens. The population is thus rapidly increasing and the waste land is gradually being used. Naturally it is used up first at the *western* end, near the crowded plains of Bengal.

4. **Crops.**—Now let us look at the crops of the Brahmaputra Valley (Fig. 96). Rice occupies by far the largest area, and it forms the principal food of the people. Nearly all the rice produced is used by the people and there is little or none left over for sending to other countries. The second most important crop is tea. Tea is made by drying the young leaves of a small bush or shrub. The tea bushes are planted in

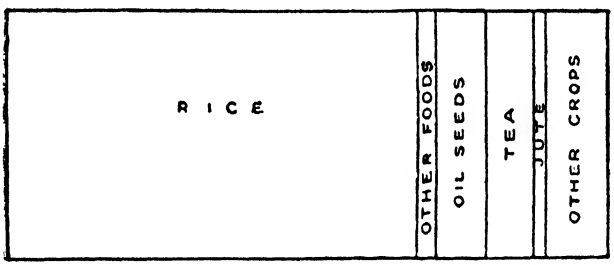



**Fig. 96. The crops of the Brahmaputra Valley**

neat rows on gentle hill slopes on either side of the Brahmaputra Valley and these tea-gardens give work to a large number of people in Assam. Nearly 120 people out of every 1,000 living in Assam work in the tea-gardens and a great many of the workers are Biharis from Bihar. Look at Fig. 63 (map showing the distribution of tea) and notice that the tea-gardens stretch beyond the Brahmaputra Valley westwards into the Sub-Himalayan Region in Northern Bengal—in Darjeeling and Jalpaiguri. The sides of the Brahmaputra Valley where the tea is grown are, indeed, very like the lower lands of the Sub-Himalayan

Region. Notice too, that a considerable quantity of tea is also grown near Sylhet, on the borders of the Garo or Khasi Hills and the flat lands of the Surma Valley. This is not, of course, part of the Brahmaputra Valley, but the conditions are similar. Tea is a crop which is grown not so much for the people themselves as for sending to other countries, and Assam sends a very large quantity of tea to Europe, especially the British Isles, where the people drink much tea.

Oilseeds form another important crop in the Assam Valley.

5. **Minerals.**—At the eastern end of the Assam Valley region, on the borders of the Eastern Hills Region, is the oilfield of Digboi, and there is a small coalfield in this part of the region also.

Notice the railways of this Natural Region. The western end of the Valley is connected with Bengal by a branch of the Eastern Bengal Railway. Running along the eastern part of the valley, south of the river, is the Assam-Bengal Railway, but the two railways are separated by the broad Brahmaputra River at Gauhati. A line runs across the lower part of the Assam Plateau to the eastern Bengal Plains. The Brahmaputra River is used by country boats for the greater part of its length. Notice the routes into the Eastern Hills Region—from Dimapur a cart road runs into Manipur State. There is also a good motor road from Gauhati to Shillong.

## B. The Eastern Hills Region[1]

1. **General Features.**—From Fig. 97 we see that the Eastern Hills Region sweeps south-westwards from the

[1] The whole region comprises a large part of Assam; the district of Garo Hills, Khasi and Jaintia Hills, parts of Cachar and Sibsagar, Naga Hills, Manipur, Lushai Hills; also Chittagong Hill Tracts in Bengal as well as the Western Mountain Wall of Burma.

far corner of Assam, where it is known as the Patkoi Hills, broadens out to form the Naga Hills and includes the State of Manipur. Here the main mass of hills swings southwards forming the Lushai and Chin Hills and Chittagong Hills, passing southwards into Arakan.

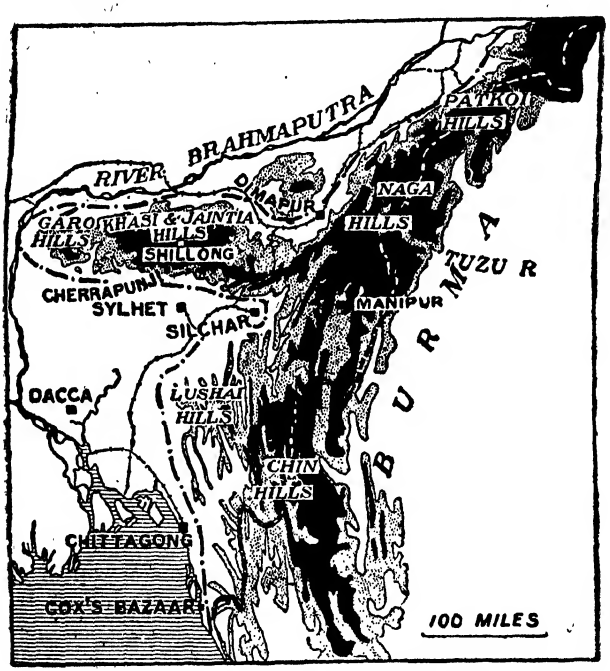



**Fig. 97. Eastern Hills Region and the Assam Plateau**

From the region of the Naga Hills a big branch runs out almost due west to form an irregular plateau—the Assam Plateau. This plateau is really formed of the Khasi and Jaintia Hills and the Shillong Plateau of Assam and finishes up as the Garo Hills. Notice from Fig. 94 how the Eastern Hills Region is separated in

the north from the Himalaya Mountains by the Brahmaputra Valley. Everywhere the Eastern Hills Region forms the 'Mountain Wall' between India and Burma. Narrow in the north, it gets broader in the centre and then gets narrower again, finishing up at Cape Negrais in Burma.

One of the chief considerations which make the Hills Region a separate part of India is that it is very difficult to get into the hills. It is easy to move about the Valley Regions because one can sail on the Ganges, or go by railway from place to place; one can also travel by bullock cart from one village to the next. But to get into the Hills Region we have to climb from the plains or the Delta up the sides of steep hills clothed with thick forest, or follow the rocky valleys of small streams; and, when we have left the plains below and reach the hills, we find that the country consists of small narrow valleys separated by steep ranges of hills, so that in whatever direction we wish to move, we have to toil up and down, along narrow jungle paths, many of which are too steep and difficult even for ponies or mules. Because it is so difficult to get into the Hills Region, the people of the plains have little to do with the people of the hills, and, in the same way the people of the hills rarely come down to the plains. The hill people have kept themselves often quite apart and, generally speaking, have not progressed nearly so much as the people who live in the plains.

2. **Physical Features.**—In order to find out what the Eastern Hills Region looks like, let us climb up amongst the Lushai Hills. Everywhere the slopes of the hills are clothed with thick wet jungle, either tall evergreen forest or a thick tangle of canes and bamboo. As we go we find leeches clinging to our legs and

drawing blood. After climbing over a number of ridges covered with forest, we find ourselves on a high ridge covered with grass. We are able to see the hills around us and we notice that they are all long ridges running from north to south with long valleys between. We look in the far distance and see higher hills, but nowhere do we see snow-covered mountains. Read what is said about the Himalayan Region and notice the differences. The hills we see in the distance are only about 7,000 feet high—the highest mountain (Mt. Victoria in Burma) is only about 10,000 feet.

Let us walk along the narrow grassy ridge and notice the forests on either side. They are wet and evergreen, but they are different from the forests we passed through on the lower slopes and consist largely of oak trees with rather thick but broad, evergreen leaves. Perhaps in some places we may see patches of pine forest. These are found from 4,000 to 4,500 feet above sea-level.

We have not met many people on our journey, but here and there we see their villages, each surrounded by a patch of cultivated land. We notice that many of the villages are situated on spurs, near a spring in the hillside, but well placed in case of attack.

Further north than where we have been, the Eastern Hills Region is broader, and in the centre occupying a plateau surrounded by hills in the State of Manipur. Manipur is sheltered by the surrounding ring of hills and has only just over sixty inches of rain. Its soil is fertile and a good quantity of rice is grown—some is actually exported.

### C. The Assam Plateau

1. **Physical.**—We can reach nearly to the foot of the Assam Plateau region by a railway which takes us to

Sylhet on the south. Then we commence to climb. The hills are here facing the south and receive the full force of the South-West Monsoon. The places on the southward-facing slope are some of the rainiest places in the world. Cherrapunji has nearly 500 inches of rain a year and in one year nearly 1,000 inches of rain fell. If the rain water remained where it fell, there would be sufficient for the biggest steamer in the world to float after only one season's rain. When we have passed Cherrapunji we find ourselves on a plateau, called the Shillong Plateau. We pass the crest and the

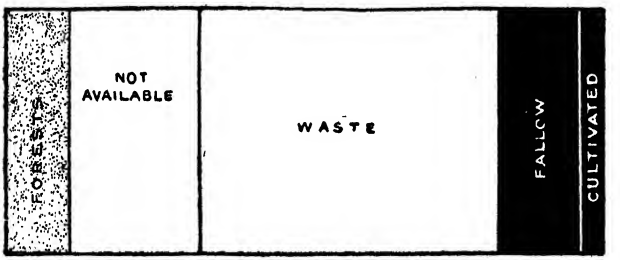



**Fig. 98. Proportion of cultivated land in the Assam Plateau and Eastern Hills Region**

Cultivated land in black (4 per cent).

plateau slopes gently to the north and there is situated the town of Shillong. Notice that Shillong is sheltered from the main force of the monsoon but still has a rainfall of 83 inches. The whole plateau is very wet and has been called by one geographer the 'megalaya' or 'abode of rain'. The Assam Hills are more cultivated than the Eastern Hills Region. On the slopes down towards the Brahmaputra Valley, we find some of the numerous tea plantations for which Assam is famous.

In this region as in the Eastern Hills many parts are spoilt by having too much rain. The rain falls so

heavily that it washes the seeds out of the ground and sometimes washes all the plants out too.

2. **Crops.**—Look carefully at Fig. 98 and notice what a very small proportion of the Hills Region and Plateau is cultivated. A part of it is covered with valuable forests, amongst which are the sal forests found especially on the Garo Hills. But the greater part of the region is covered with forests which are too far away to be of any use; or with waste land of bamboo, canes and grass. Although such a small proportion of the area is cultivated, nine out of every ten persons are engaged in agriculture. But few people live in the Regions—only about fifty for every square mile. Rice is the most important crop in this region. Some of the more advanced hill-tribes make terraced fields for their rice, but most of them simply burn down a piece of jungle, cultivate a few crops and then move to some other spot. Although the climate of the hills is wet, there is a coarse kind of cotton which will grow and we find it especially in the Garo, Lushai and Chittagong Hills. Some fruit trees such as oranges can be grown and are being tried in the Garo Hills.

The only mineral industry of importance is quarrying limestone and making lime in the Khasi Hills.

The Eastern Hills Region is inhabited by various hill-tribes who, like the hill-tribes of the Himalayas and the people of Burma, are more allied to the Chinese than to the Indians. Examples of the hill-tribes are the Nagas, Chins and Chinboks. In the Garo Hills, however, we find settlers from other parts of India, notably from Bihar, are coming and cultivating the land. Many of them have worked in the tea-gardens of the Brahmaputra Valley.

3. **Roads of Assam.**—We must now consider the roads into the hills. There is now a railway joining the upper part of the Brahmaputra or Assam Valley and the plains of the Delta, running as far as the port of Chittagong. This railway cuts across the hills as shown in Fig. 97. It has two short branches on the south side—one to Sylhet from whence we can approach the rainy southern slopes of the Assam Hills. Shillong, the principal town of Assam, is more easily reached from the north side from the railway running along the Brahmaputra Valley. The State of Manipur is reached by the important cart and motor road from Dimapur; perhaps one day a railway may run along the same route and continue on into Burma.

Where the various routes leave the flat land and commence to climb into the hills, there are villages, which may be called the frontier villages between the Plains Region and the Hills Region.

To such villages, the people of the hills come down occasionally to buy extra food, or a few luxuries. The situation of these places is good for cultivation, because the mountain torrents, rushing from the hills, enter the plains and provide plenty of water. The climate, however, is unhealthy in every case.

### QUESTIONS AND EXERCISES

1. The population of the Brahmaputra or Assam Valley is increasing. Why?
2. Write an account of the tea industry in North-eastern India.
3. Describe the climate of the Assam Valley.
4. The Brahmaputra River is longer than the River Ganges, yet its valley is much less important. Why?
5. Explain by means of diagrams the reason for the following differences in rainfall:—Cherrapunji 486″, Shillong 83″, Gauhati 67″, Manipur State 63″.
6. Describe the natural vegetation of the Eastern Hills Region.

7. If there were roads and railways into the Eastern Hills Region, what products might be obtained?

8. Write an account of the agriculture of the Eastern Hills Region.

9. Show by sketches how a pass may be formed.

10. Find another natural region in the world like the Eastern Hills Region.

# CHAPTER XV

## NEPAL, SIKKIM AND DARJEELING

### I. THE STATE OF NEPAL

Although Nepal is a kingdom quite independent of India, we will consider it next, because it lies to the north of the Ganges Plain, and in Nepal we can learn something more about the Mountain Wall which guards India on the north. The ruling race in Nepal is the Gurkhas, fine brave men who make good soldiers. Many of them volunteer for service in the British Army. For over a century there has been peace and goodwill between Nepal and India. Nepal stretches for 500 miles along the Himalayan Chain; to the north lies the Plateau of Tibet, to the south is the Ganges Plain. Nepal falls into two natural regions, the Himalayan Region and the Sub-Himalayan or Sub-Montane Region. Just to the east of Nepal lies the little State of Sikkim as well as the Darjeeling District of Bengal. We will study these at the same time.

### II. THE HIMALAYAN REGION

1. **General Features.**—The word 'Himalaya' means the 'abode of snow' and refers to the coat of snow which never leaves the high mountains.

In order to find out what the Himalaya Mountains look like, let us make a journey up to Darjeeling. In March, April and May it gets very, very hot and work in school is so difficult that most of you have holidays from school at that time. You can imagine it must be still harder for Europeans, who are used to a much

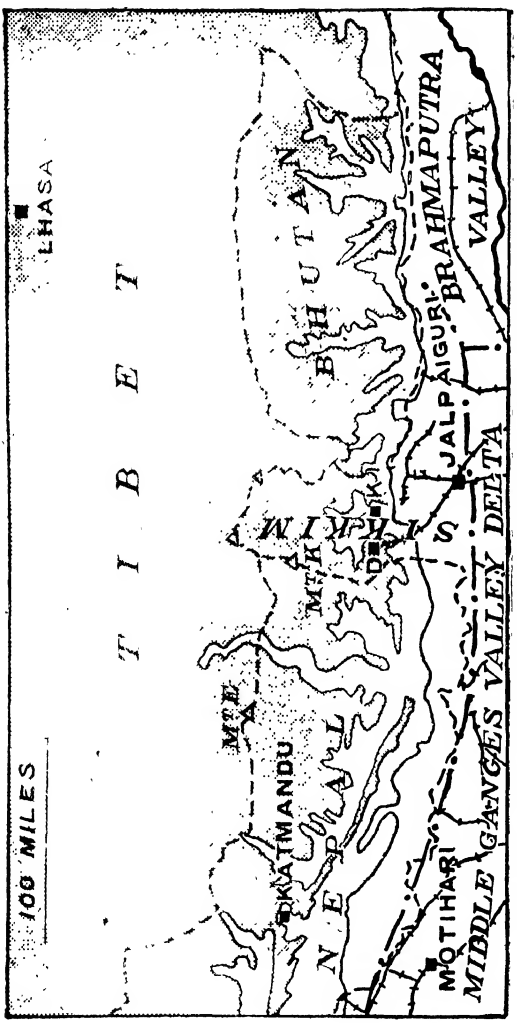



Fig. 99. The Himalayan and Sub-Himalayan Regions, Eastern Half

Mt. E, Mt. Everest; Mt. K, Mt. Kinchinjunga; D, Darjeeling; K, Kalimpong.

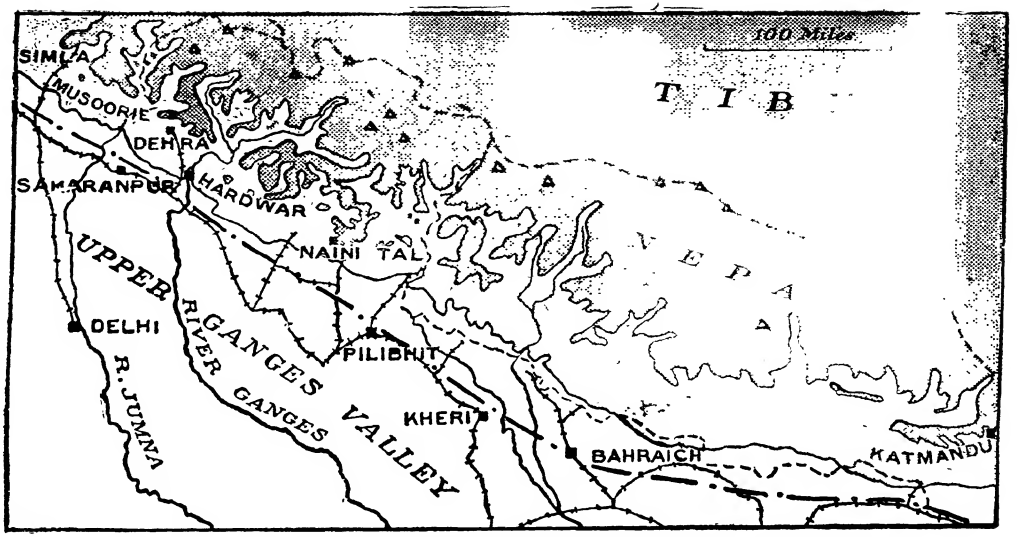



**Fig. 100. The Himalayan and Sub-Himalayan Regions, Central Part**

Notice the line of towns and the railway along the borders of the Sub-Himalayan Region. Notice the line of Hill Stations on the nearest high ground (above 5,000 feet). The Himalayan Region comprises roughly the land over 5,000 feet (dark). Land between 1,000 and 5,000 feet (light). All peaks marked by triangles are over 20,000 feet.

colder country, to live on the plains during the Hot Season. And so they have built a town high up in the mountains, 7,000 feet above the plains below, where they can go and work during the Hot Weather. This town in the hills, called Darjeeling, is reached by a little mountain railway or, still more easily by a modern motor-road. If the railway and the road had not been built, it would take us many days to climb high hills, covered with forest, cross deep narrow valleys and climb still more hills before we could reach Darjeeling. But now the little railway takes us up the 7,000 feet in a few hours and a good motor in under three hours. Away from the railway and road, cart-tracks are very few and travelling is measured not by miles, but by the number of hours required for the journey. The little mountain railway has rails only two feet apart (we call this a 2-foot gauge) and starts from the plains (at Siliguri), which although 300 miles from the sea, are there less than 400 feet above the level of the sea. From there the railway winds about amongst the forests of the Sub-Montane Region. After it has climbed 5,000 feet, we pass out of the tropical forests, and the different kinds of trees remind us that we are now in the Himalayan Region. Still we wind about amongst forest-covered hills, getting steadily higher and higher till at last we reach Darjeeling more than 7,000 feet above the level of the sea. Let us suppose we have been fortunate and arrived on a day when the air is fine and clear. Away to the north we see a wonderful range of giant mountains—the Kinchinjunga Range—covered with snow. In the far distance to the north-west we may catch a glimpse of Mount Everest, the highest mountain in the world. Mount Everest, which is over 29,000 feet high, seems to be only one of a long chain of peaks stretching east

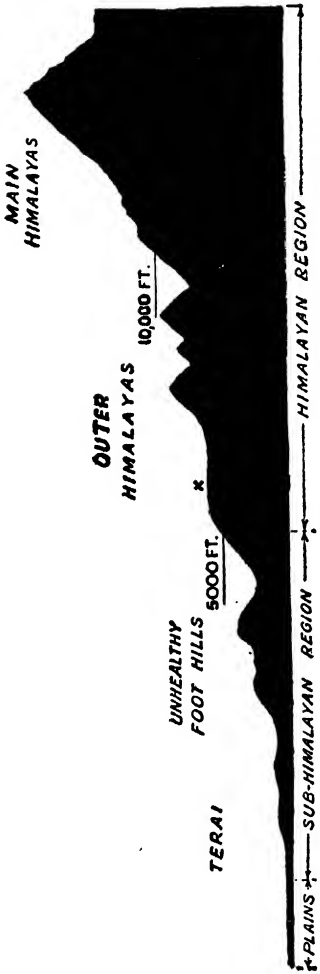



Fig. 101. Section through the Himalayas (East)

and west and forming the axis or main chain of the mountain range. Nearly everywhere the height of the ridge is 18,000 or 19,000 feet. Kinchinjunga shown in Fig. 5 is the third highest and perhaps the most magnificent mountain in the world. It looks higher than all the others because it stands by itself.

If we look to the east and to the west from Darjeeling we see a broad belt of mountains, not so high as the ones to the north, but still very big. These form the Lower or Outer Himalayas. We can thus divide the Himalayan Region (in the east) into two parts:— The main Himalayan Range and the Lower or Outer Himalayas. A third

part, the Sub-Montane Region or the Sub-Himalayan Region you learn about in a separate chapter. We shall see later that in the Western Himalayas there are four ranges.

2. **The Eastern Himalayas.**—Let us now take a journey from Darjeeling and learn something about the Eastern part of the Himalayan Region. This part of the Himalayas catches the full force of the South-West Monsoon and the rainfall is very heavy—more than 100 inches. If we go further west it gets rather less, for the monsoon wind has to blow great distances across the land before it reaches the mountains, but everywhere it is good. At Simla, it is sixty-three inches, but gets less further west. If we stand on one of the hills near Darjeeling, we can see the clouds rolling up from the sea in the Bay of Bengal as in Fig. 35. We are so high that we are above the clouds and when they strike against the mountains we find ourselves enveloped in a thick white mist and everything around us is hidden. That is what it feels like to be in a cloud and for half the year the Darjeeling hills are covered by such mists. As we go on our journey the vegetation around us is everywhere very rich. The forest consists of broad-leaved evergreen trees, of which different kinds of oak are the most important. When we climb higher and reach more than 9,000 feet above sea-level, the forest becomes quite different and our path winds through beautiful and stately pine trees. Some of them are so large that two men could scarcely make their hands meet around the trunk, and these trees are as straight as a ship's mast. Their leaves are very narrow, shaped like large needles, and the ground beneath the trees is covered with brown 'pine needles' and pine cones, which give a fresh healthy scent to the air around.

As we pass along, we notice that wherever the bark of the pine tree has been injured, thick resin oozes out and solidifies on the surface.

As we rise still higher, we leave the pines and about 12,000 feet enter into what is called the Alpine Zone. Here the ground is covered with Rhododendrons; sometimes forming dense thickets, at other times forming trees with red twisted stems. The higher we go the poorer and smaller become the shrubs; much of the ground is covered only with tufts of mountain flowers or grass. Above us we see stretches of snow and if we are able to climb high enough we pass at 16,000 feet above sea-level into the land of everlasting snow. The 'snow-line' is the line above which the heat of the sun in the hot season is unable to melt the snow which falls in the cold season.

We have learnt from our journey that the eastern part of the Himalaya Mountains can be divided into four belts, according to the vegetation and height above sea-level: —

| | | |
|---|---|---|
| (4) Snow | ... | 16,000 feet to the top of the mountain. |
| (3) Alpine Belt | ... | 12,000 to 16,000 feet. |
| (2) Coniferous Forest Belt | ... | 9,000 to 12,000 feet. |
| (1) Evergreen Oak Forest Belt | ... | 5,000 to 9,000 feet. |

Although the forests are dense and contain many different trees, yet they are of little commercial value at present. They are too far away. It is difficult for a man to get from the hills, to the plains and, therefore almost impossible for him to haul trunks of trees to those places where they can be sold. The cost of getting at the timber, or other forest products such

as resin, is so great that it does not pay to try, and so the forests are left to themselves, except where they are nearest to the plains. In the colder parts of the world such as Norway, Sweden, Russia and Canada, there are great pine forests like those on the Himalaya Mountains but growing near sea-level and so easily reached. Most of the boxes in which goods from foreign countries are brought to India are made from the wood of these forests.

3. **People of the Eastern Himalayas.**—In our journey through the mountains we have not seen many people. In the whole natural region there are less than 100 people to the square mile, usually many less. The State of Sikkim, for example, has only thirty people to the square mile. We have, however, noticed a few villages scattered amongst the hills. The villages are not large, but consist of just a few huts and each village is surrounded by a patch of cultivation. The people burn down a small piece of jungle and the ashes make the soil rich for a short time. A few crops such as maize are grown but after a year or two the people move away and clear another patch of fresh jungle. Often they move their village too. The villagers look quite different from us. They are small but strong, have rather flat faces and make us think of Chinamen. They speak many different languages and the people in one village often speak a different language from those in the next. They can understand one another, however, because they can both use another language—Nepali. The most important hill tribes in the Himalayas are Nepalese. The ruling race in Nepal is the Gurkhas, small sturdy men who make very good soldiers. In the State of Sikkim, which is part of British India, the Lepchas and Bhutias are important tribes. We often meet too, Tibetans and

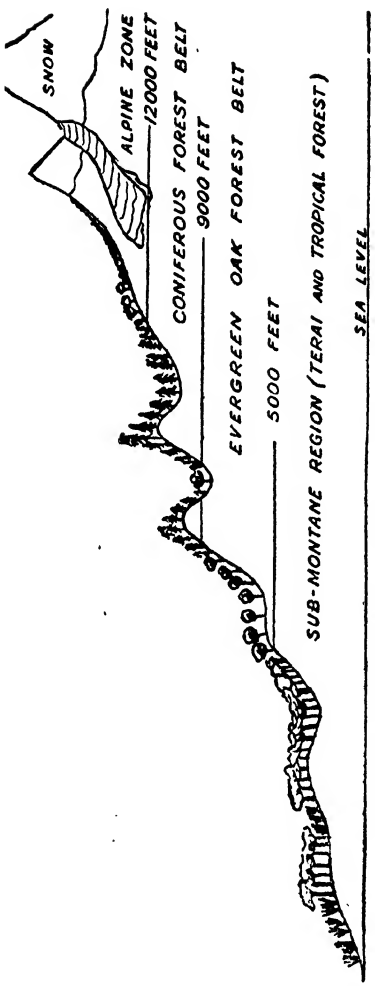



Fig. 102. Vegetation zones of the Himalayas (East)

others who have travelled over the mountains from Tibet (see Fig. 78). We find that the people, although they live amongst the mountains, do not like cold and the Lepchas especially usually build their villages in the warmer valleys.

It is impossible to live in the very highest parts, even if men can stand the cold. You have learnt that the air gets thinner as we ascend and at great heights it is so thin that man cannot breathe. He has to take a big bottle of compressed air or oxygen with him. No one has ever been able to climb to the top of the highest mountains. But in May 1933 two Englishmen climbed to within 600 feet of the

summit of Mount Everest, and in the same month another group of Englishmen flew over the mountain in aeroplanes specially constructed for the purpose. There have been many attempts to climb to the top and several lives have been lost.

4. **Denudation in the Mountains.**—There are many things which we can learn in the mountains and which we cannot understand easily if we live in the plain. Let us stop for a moment and look at one of the rivers in the Himalayan Region. In the wet season it is a roaring, rushing torrent at the bottom of a deep V-shaped valley quite different from our quiet rivers of the plains. Its floor is strewn with big stones and boulders which the stream is pushing gradually downwards, knocking them against one another and breaking off pieces and rounding the bigger ones. Gradually the stones are worn smoother and smaller. The little pieces which are broken off form sand and the smaller pieces are just like mud. When after a long journey this fine material reaches the plains, it will form the alluvium which we know so well. Here in the mountains we can see the alluvium in the process of formation. Let us follow up the mountain torrent and find its source. It will take us many days of hard travelling, for we shall find the stream has many waterfalls up which we must climb and the forest on either side is dense. After a long time the forest becomes thinner and we emerge into the Alpine Zone. We are now very high up and the air feels very cold. We put our hand in the water of the stream and find it as cold as ice. If we go on a little farther, we may find that our stream is flowing from a hole in a mass of ice. We climb up on to the ice and find that it stretches right away up into the mountains as a river of ice. Such a frozen river is called a glacier. As we

stand on it, it does not seem to move; but if we could watch it from day to day, we should find it moving gradually downhill and melting to form the river. On either side of us rise rugged mountains, partly covered with snow, but with steep slopes of bare rock. At the bottom of the steep slopes are piles of broken rocks, rough pieces of all shapes and sizes. Piles of rock at the bottom of steep slopes like this are called 'screes'. How do they get there? Well, water gets into the cracks of the rocks of the mountains and during the cold night freezes. Water, when it freezes, expands or grows larger and so the crack in the rock is made bigger. When the water melts or thaws again, a big piece of rock will fall off and down into the valley. So we see the high mountains are gradually cut away by the action of 'frost' freezing the water in the cracks. Some of the pieces may fall on to the glacier and be gradually carried down into the river valleys.

5. **Rivers of the Eastern Himalayas.**—In the east only one of the rivers has succeeded in cutting through the great Mountain Wall. The River Brahmaputra has a long course in Tibet, and then turns south and cuts right through the Mountain Wall. Another river has nearly cut through and actually rises to the north of Mount Everest. One of the most important passes is reached from Darjeeling and leads to the city of Lhasa, the capital of Tibet. At the eastern end of the Himalayas there are passes into China.

6. **Towns.**—There are few industries in this region. Darjeeling as well as being an important hill station is also the centre of numerous tea-gardens (see Fig. 64). There tea is grown on the hill slopes. Further east is Kalimpong, through which town wool is imported from Tibet. Nepal is not part of India; its

capital is Katmandu. The hill station of Simla, the 'summer capital of India', is situated on the outer Himalayas.

## III. THE SUB-MONTANE OR SUB-HIMALAYAN REGION

1. **General Features.**—Between the broad cultivated plains of the Punjab, the Ganges Valley or Brahmaputra Valley and the Mountain Region of the Himalayas there is a belt of country which is very different from either. In some places it is flat or gently waving land only slightly above the level of the plains, but at other places it includes separate ranges of hills—the foot hills of the Himalayas. Such ranges of hills are the Siwalik Hills, in the northern part of the United Provinces, the Churia Ghati Hills in the southern part of Nepal, the Dun Hills in Northern Bihar, and the Sinchula Hills in Northern Bengal, as well as the lower slopes of the outer Himalayas themselves in the west. The Sub-Himalayan Regions sometimes suffer severely from earthquakes.

The Sub-Montane belt is bounded on the south by the cultivated plains of the Ganges or Brahmaputra Valleys; on the north it extends to a height of 5,000 feet in the Himalayas where it passes into the Himalayan Region. In the Himalayan Region the swift mountain streams are busily breaking up the rocks into small pieces—pebbles and sand. Often the descent to the low ground is sharp and there the streams spread out and deposit a 'fan' of gravel and sand. Much of the Sub-Montane Region consists of sand deposited in this way.

2. **The Western Part of the Sub-Himalayan Region.**—Very often we can divide the eastern part of the Region into two distinct strips. The part nearest the

flat plains of the Ganges is only slightly raised above their level. This strip is often covered with coarse, tall grasses and is known as the 'Terai'. Near the Himalayan range we come on to a belt of hills, usually covered with forest, damp and unhealthy. These hills do not as a rule exceed 4,000 feet; behind them rise the healthy hills belonging to the Himalayan Region. It is interesting to note how man has been controlled by physical geography in building his towns. On the borders of the Terai and the Ganges Plains we find a long line of towns—Saharanpur, Pilibhit, Kheri,

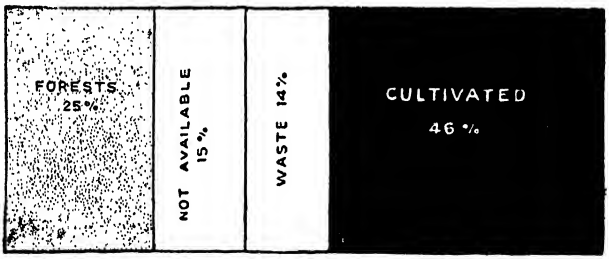



**Fig. 103. Proportion of cultivated land in the wetter eastern part of the Sub-Montane Region (Jalpaiguri and Darjeeling)**

Bahraich, Motihari, Jalpaiguri, etc. Find these on the map. For considerable distances a railway runs along the line between the two natural regions. These towns mark the northern limit of the fertile Ganges Plains, but from there cultivation is now being gradually extended into the Terai. On the other side of the Sub-Montane Region we find a line of hill-stations. The hills of the Sub-Montane Region are unhealthy, so we find the hill-stations are built on the first line of hills belonging to the Himalayan Region. Examples are Simla, Mussoorie, Naini Tal and Darjeeling. Study Fig. 101 carefully. It shows you a section drawn from

the plains, through the Sub-Montane Region into the Himalayas.

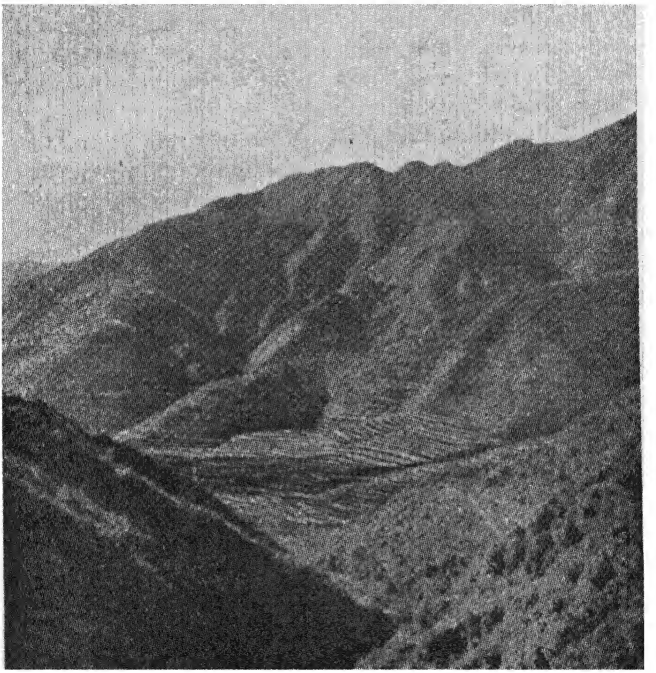
The Sub-Montane Region occupies considerable areas in the United Provinces; along the southern part of Nepal and along the borders of Nepal and Bihar; in Northern Bengal and the borders of Bhutan where the 'Terai' country is known as the 'Duars'. The rainfall varies from 40 or more inches in the west to well over 100 in the east, but there are marked local variations, some valleys being almost dry whilst some hill ranges have a very heavy fall.

3. **Vegetation of the Eastern Part.**—The eastern part of the region is wetter than the western and the characteristic vegetation of the more hilly parts is a monsoon Forest of the valuable sal trees. This forest stretches from the border of the Punjab to the east, but over large areas it is interrupted by tracts of coarse grass such as occur on the Terai. The Terai is covered with coarse grass, or coarse grass with scattered trees. Grassland with scattered trees is called Savanna.

In the west there are numerous patches of dry thorny forest, in the wetter east there are patches of very damp evergreen forest. In the wet east it is found that the dry sal forest occurs on the ridges, and rich wet tropical evergreen forest in the valleys.

4. **People and Towns of the Eastern Part.**—The eastern part of the region is very unhealthy and the inhabitants suffer greatly from fever. So we find the region is thinly populated; the chief inhabitants are forest tribes who live and make their scattered clearings in forest and grassland. Gradually, however, man is draining the damp unhealthy places and conquering the diseases. In the United Provinces much of the Terai is now cultivated and thickly populated; in

Northern Bengal are rich tea gardens. The sal forests are both important and valuable. There are very few towns in this area. Baxa guards the approaches to



[*Photo : L. D. Stamp*

**Fig. 104. Hill-sides in the Sub-Himalayan region near Mussoorie (U.P.) terraced for cultivation**

Bhutan, and Dehra Dun at the western end is one of the head-quarters of the Forest Department in India and the site of the Forest School is here. A famous

and sacred place is Hardwar, where the river Ganges leaves the mountains. Cultivation is being pushed into this region from the line of towns on the borders of the plains and parts of it are now being extensively used. We find that in the north-western part of the United Provinces there are but few people—150 to the square mile. But further east cultivation has been pushed much further into the Terai and the population rises to 500 per square mile. In northern Bengal it is about 300 (Jalpaiguri). What can we learn, too, about the amount of cultivated land? We find that most of the 'districts' made by Government cover part of the Sub-Montane Region and part of the Plains Region and so it is difficult to separate the two in Government Reports. If we take two districts in the United Provinces which are almost entirely in the Sub-Montane Region and which may be regarded as typical, we notice the large area of forest, a moderate proportion of waste land and a moderate to good proportion of cultivated land.

## QUESTIONS AND EXERCISES

1. Describe the natural vegetation of the Himalayan Region.
2. Describe the climate of Darjeeling or Simla.
3. Write an account of the people of the Himalayan Region.
4. How are rocks worn away in mountain regions?
5. Find another natural region in the world like the Himalayan Region.
6. Compare the Sub-Himalayan Region with the regions which lie on either side.

# CHAPTER XVI

## KASHMIR

### I. THE STATE

Kashmir is a large Native State, situated amongst the Mountains of North-Western India. It is ruled by the Maharaja of Kashmir and Jammu, whose capital is at Srinagar.

The greater part of Kashmir lies in the Himalayan Region, but the Himalayas are somewhat different here from what they are in Nepal. The north-eastern corner of the State lies on the Tibetan Plateau, whilst the south forms part of the Sub-Himalayan Region.

### II. THE HIMALAYAN REGION

1. **Physical Features.**—In the east, that is, in Nepal or Sikkim, the Himalayan chain is comparatively narrow. But towards the west, in Kashmir, it is much broader and four great parallel ranges of mountains can be distinguished: —

The Muztagh-Karakoram Range.
The Inner Himalayas or Zanskar Range.
The Middle Himalayas or Pangi Range.
The Outer Himalayas or Pir Panjal Range.

The Muztagh-Karakoram Range is the highest of all and there are many great peaks more than 25,000 feet, of which K2, or Mount Godwin Austen, is the highest, and probably the second highest mountain in the world. This great chain of mountains completely shuts off the bleak Tibetan Plateau beyond. One difficult gateway, or pass—the Karakoram Pass—crosses the range and is the road from Leh to Tibet.

The inner Himalayas also form a great wall, with peaks more than 20,000 feet high.

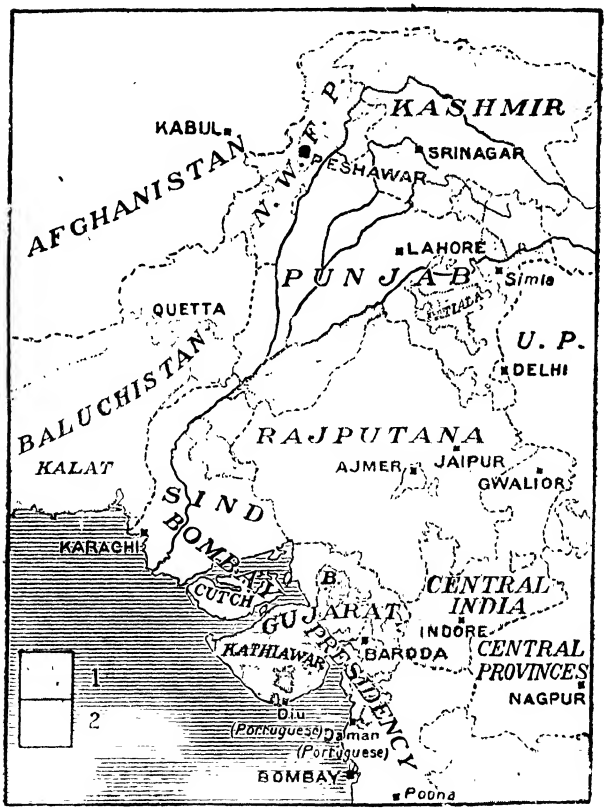



**Fig. 105. Political map of North-Western India**

The Middle Himalayas are not quite so high, but many peaks are more than 15,000 feet high.

The outer Himalayas have an average height of 10,000 to 12,000 feet. Though the peaks are not much more than half the height of Mount K2 it is this range, with its snowy crest, which the dwellers in the plains can see.

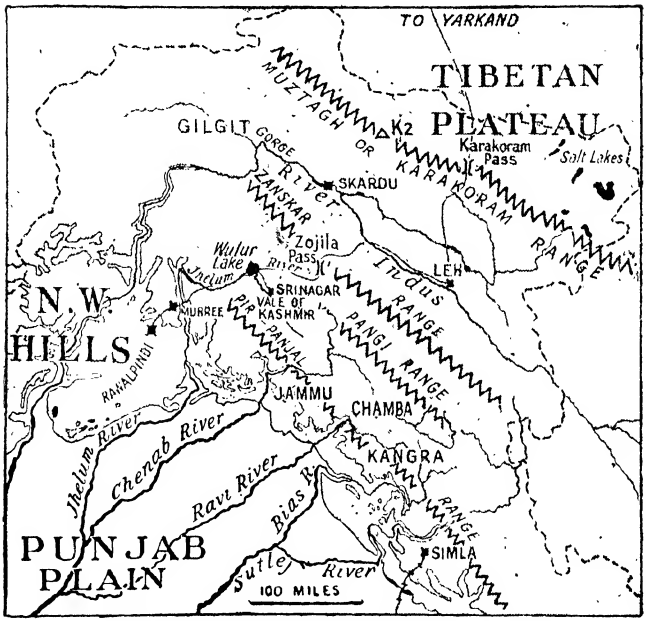



**Fig. 106. The Himalayan Region (West)**

The Indus River rises in the Tibetan Plateau and for a long distance flows between the great Karakoram Range and the inner Himalayas. The monsoon is not felt on the Tibetan Plateau; in reality it is the Inner Himalayas which prevent it being felt and so the Upper Indus Valley, around the town of Leh, is very dry. After the town of Skardu, the Indus passes through a

tremendous gorge, is joined by the Gilgit and then turns southward, then west again and finally south till it cuts its way through the mountains to the plains. Between the Middle and Outer Himalayas is a valley different from most of the mountain valleys. It is broader and has a lake (Wular Lake). This valley is the Vale of Kashmir and is one of the most beautiful valleys in the world. The river draining it is the Jhelum on which is situated Srinagar, the principal town of Kashmir. The rivers of the Punjab Plains —the Chenab, Ravi, Bias and Sutlej have cut through the Outer Himalayas and sometimes the Middle, but only the Sutlej cuts right through and rises in Tibet.

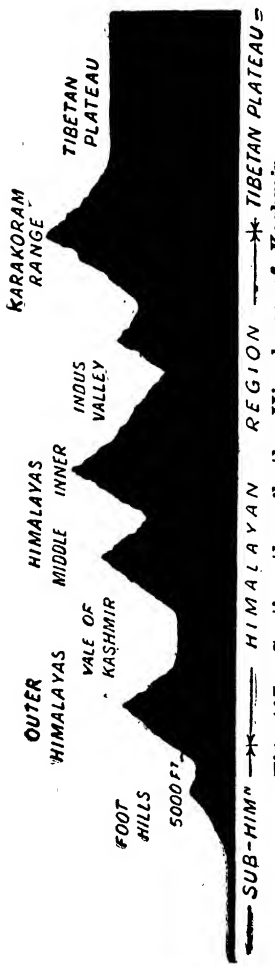



Fig. 107. Section through the Himalayas of Kashmir

Note carefully on the map the few and difficult passes through the mountains—one from Srinagar across the Zojila Pass to Leh and then to Yarkand in Tibet. Another pass is the Shipki Pass.

2. **Western Himalayas (Forest).**—In the west the

climate is drier, and has a greater range of temperature. The forests here usually clothe the northern sides of the mountains, where they have more shade, so that the snow lies longer and the moisture is not dried up by the sun. The southern side is often a bare, stony slope or covered with short grass and bushes. Fig. 108 is a section showing the vegetation zones in the Western Himalayas. The scrub of the plains begins to change in the Sub-Himalayan Region at a height of 3,000 feet. At 5,000 feet we enter the Himalayan Region and from 5,000 to 10,000 or 12,000 feet is found the temperate mountain forest. It is a little difficult to separate this forest into two zones as we did in the Eastern Himalayas. It consists of a mixture of the broad-leaved oaks and the narrow-leaved pines and deodars. The latter is a fine tree and yields valuable wood. Above the forest comes the Alpine zone and then snow. The forests of Kashmir are more easily reached than those of the Eastern Himalayas, and the logs of deodar and blue pine are floated down to the saw-mills in the plains.

3. **People of the Western Himalayas.**—Again there are few people in this region. Their crops usually have to be grown in tiny fields on the hill-sides (see Fig. 104). Below 8,000 feet the most important crop is maize, but wheat can also be grown up to this level. Buckwheat is grown on the poorer, stony soils. Rice is grown in tiny fields at the bottom of valleys. The rice-fields are carefully levelled and water is brought to them in little canals. The Kashmiris are the principal people, and they live in the more sheltered valleys. In the wilder parts, such as the Indus Valley, the only inhabitants are a few wandering shepherds. The hill States in the northern parts of the Punjab are all similar to Kashmir in general features.

4. **The Vale of Kashmir.**—The beautiful Vale of Kashmir deserves a special description. The hill-sides, for example at Gulmarg, owe their beauty largely to the rich growth of mountain flowers. The more accessible hill slopes are covered with terraced fields and the vale is famous for its fine fruits—apples, pears, oranges, etc. Through the vale wanders the Jhelum River, here broad and navigable and unlike most Himalayan rivers. So valuable for crops is the land near the river that the people try to make more by building rafts and sprinkling a little earth on them and then planting seeds on the 'floating islands'. Sometimes one man can steal and take away another man's lands. Srinagar is famous for its wood-carving industry, local wood being used. The State of Kashmir derives a considerable revenue from the sale of the bark of the Kut tree, which is used in medicine. Other towns—very small ones—in the

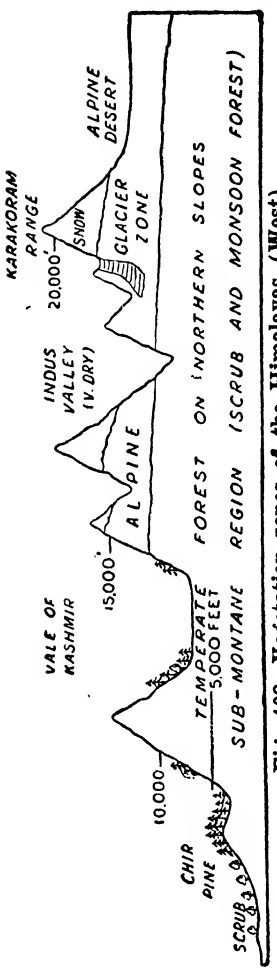



**Fig. 108. Vegetation zones of the Himalayas (West)**

region are Leh and Skardu in the Indus Valley.

## III. THE WESTERN PART OF THE SUB-HIMALAYAN REGION

The western part of the region is much drier than the eastern, but again can usually be divided into two strips. The outer and lower strip including the slopes of the mountains upto 3,000 feet is usually covered with a poor monsoon forest or scrubland. The most interesting tree in the forest is *Butea,* known by various names such as chichra, dhak, and palah. Probably much of the Sub-Montane Region was once dhak forest. It makes good firewood, gives a useful gum, and dye can be made from the beautiful red flowers, whilst cattle eat the dried leaves. But the dry forests of this strip are most valued for their yield of bamboo. The other strip extends from 3,000 to 5,000 feet above sea-level and the chir pine is very common. From the resin of this tree turpentine can be obtained.

The western part of the Sub-Himalayan Region is not so unhealthy as the wetter eastern parts.

The region has a rainfall of 30 to 40 inches and so dry crops can be grown without irrigation. Wheat and maize are the most important, but gram and millet are also grown and, in addition, much fodder. The useless scrub forests are gradually being cut down and cultivation extended. This has to be done with much care owing to the dangers of soil-erosion. When the trees are cut down the rain can easily wash away the soil.

The great irrigation canals of the Punjab Plains take their water from the great rivers just where the rivers

**Fig. 109. General view of Srinagar and the Jhelum River, Kashmir**

leave the hills. Along the borders of the Sub-Himalayan Region there is a line of great irrigation works. As in the eastern part of the region, there are also a number of trading centres, where people come down from the hills and buy or exchange goods with dwellers on the plains.

## IV. THE TIBETAN PLATEAU

1. **General Features.**—If we could continue our journey across the Himalayan Region in Kashmir and climb over the high pass of Karakoram (18,000 feet) across the Karakoram Mountains, we should find a very great change of scenery. We leave behind us the mountain forests, and little cultivated patches. Instead we find a barren, bleak upland with scarcely any vegetation; a dry sandy waste with salt lakes scattered over its surface. Here and there are ridges

of bare stone, crumbling under the destructive action of frost. The total rainfall, including snow, of this barren land is only about 3 inches a year, but enough to keep much of it covered with snow for many months of the year.

2. **Population, etc.**—Only a small part of this great region lies within the borders of India—in the north-east of Kashmir. This part is almost uninhabited, there are a few wandering traders who pass from Yarkand in Tibet to Leh and Srinagar in Kashmir in the warmer months. This area is part of the highest plateau in the world, 'The Roof of the World'. Cold and barren as this land is in the winter, it is almost worse in the summer, for the air is so thin that the sun shines down and makes the rocks too hot to touch, whereas it may be freezing in the shade. The days are hot, but at night it gets very, very cold.

Not only is the region outside the monsoon area of India, but even the rivers flow away from India towards the heart of Asia. It is a region of 'inland drainage'.

The few people who can exist in this region are Mongols, more like a Chinaman than an Indian to look at, and by religion they are Buddhists. They obtain salt and another mineral, borax, from the shores of the salt lakes and in the early summer often bring the salt and borax to exchange for Indian goods in the Punjab bazaars. Often they use sheep as beasts of burden and tie the little bags of salt on the backs of the sheep. One important beast of burden in this region is the Yak, an animal rather like a bullock with a large hump and long hair.

In the section on the Himalayan Region, the Indus Valley in Ladakh, around Leh, was included. Remember that it is a very dry valley and half way in

character between the forested Himalayas and the barren Plateau of Tibet.

## QUESTIONS AND EXERCISES

1. Describe the natural vegetation of the Himalayan Region.
2. Describe the climate of Simla.
3. Draw a sketch-map showing the main mountain ranges and river valleys of the Himalayas.
4. How are rocks worn away in mountain regions?
5. Write an account of the people of the Himalayan Region.
6. Compare the Sub-Montane Region with the regions which occur on either side.

# CHAPTER XVII

## THE NORTH-WEST FRONTIER PROVINCE

### I. THE PROVINCE

The North-West Frontier Province is one of the major or 'Governor's' provinces and lies mainly between the Punjab and the Afghan frontier, on the western side of the Indus. It consists of three Districts and a large tract of 'tribal territory' lying between them and the frontier. The tribal people are left to themselves unless they become restless and attempt to raid the people of the plain. Nearly the whole of the province is part of a single natural region which may be called the North-Western Dry Hills Region. Some of the adjoining districts of the Punjab belong to the same natural region.

### II. THE DRY HILLS OF THE NORTH-WEST[1]

1. **General Features.**—In the north of India there is a dry hilly region divided into two parts by the River Indus. To the east of the river lie the Salt Range and the dry, sandy plateau of Attock which forms part of the West Punjab; to the west of the river are the hills and mountains of the North-West Frontier Province interrupted by broad fertile valleys such as that of Peshawar.

[1] This natural region comprises nearly the whole of the North-West Frontier Province except the northern part as well as the districts of Jhelum, Rawalpindi and Attock in the West Punjab.

The Cis-Indus Tract (West Punjab), or part of the region on the east side of the River Indus, consists of a dry, sandy plateau bounded on the south by the Salt Range; lower slopes of the Outer Himalayas bound this area on the north.

The Indus Valley is a fine tract, but the harvests vary greatly with the extent of the floods from the river.

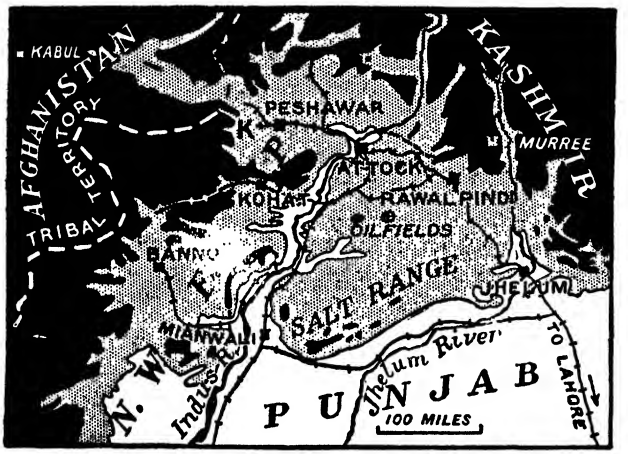



**Fig. 110. The Dry Hills Region of the North-West**

The tract between the Indus and the hills of the frontier consists of a series of three plains—Peshawar, Bannu and Dera Ismail Khan—divided from one another by the low hills of Kohat and offshoots of the frontier range. The Vale of Peshawar is highly irrigated and well wooded, presenting in spring and autumn picture of waving cornland and smiling orchards framed by rugged hills. To the north of the Vale of Peshawar is the wild mountain country of

Chitral, from whence the Swat River receives its water. Adjoining Peshawar to the south is the district of Kohat, a rough hilly tract intersected by narrow valleys. The southern spurs of the Kohat hills fade away into the Bannu plain. Where it is irrigated from the Kurram River the Bannu Plain is very fertile, especially round Bannu itself. Where not irrigated there are broad stretches of rough stony ground broken up by deep gullies cut by flood water from the hills. Nearer the Indus River the plain is more fertile again, but its crops depend on the rainfall which varies very much from year to year. A broken range of sandstone hills divides the Bannu Plain from the Daman or plain land of Dera Ismail Khan. This plain is a clay desert, but the soil is fertile and in good rainfall years there is an abundant crop of grass. In

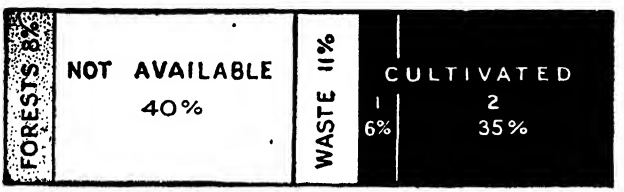



**Fig. 111. Cultivated land in the Dry Hills Region**

these plains of Peshawar, Bannu and Dera Ismail Khan the summers are very hot and the winters very cold—frost occurs nearly every year. The plain land, where fertile, is densely populated.

To the west of these three plains lie the barren, treeless hills inhabited by the wild tribes of the frontier—Waziris, Afridis and Orakzais. Here and there are fertile valleys, such as the upper part of the Kurram Valley. In such valleys are little hamlets and sometimes forests of stately pine trees. Some of the

hill-sides in the valleys are clothed with grass and the people of Kohat keep large numbers of sheep. These inhospitable hills of the frontier are almost outside the influence of the monsoons and most of the scanty rain falls in the cold season. In the cold season it is temperate. All the hill tribes belong to the group of people known as the Pathans.

2. **Crops.**—Turning now to the agriculture of the region, notice first Fig. 111. This diagram does not include the hills and mountains of the tribal tracts,

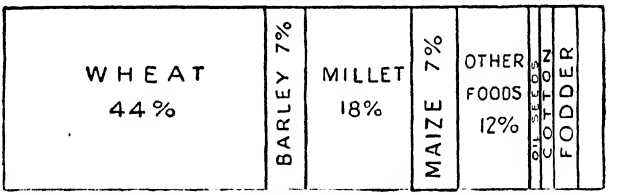



**Fig. 112. Crops of the Dry Hills of the North-West**

but simply the districts of Jhelum, Rawalpindi, Attock, Peshawar, Kohat and Bannu. Forests cover 8 per cent, but many of these forests are merely scrubland, valuable because even the poorest timber has a value for firewood in such dry country. Nearly half is occupied by hills, mountains, and useless ground and the proportion of waste land which might be used is only small. Most of the waste land is found in the plain of Dera Ismail Khan which is not yet irrigated. The cultivated land comprises both irrigated land and land with dry crops. The most important irrigated areas are in the Vale of Peshawar, watered by the Government Canals known as the Upper Swat Canal, Lower Swat Canal and Kabul River Canal. Many of the crops of the Bannu and Dera Ismail Khan plains are also irrigated, but on the sandy plateau of Jhelum and Attock dry crops are mainly grown. Fig. 112

shows the crops of the natural region. Wheat is the most important. Seen in the spring after a few showers of rain, the irrigated plains of Bannu or Peshawar present to the eye a vast waving sea of wheat, with here and there streaks or patches of darker coloured gram. After the harvest the same areas have been described as 'a bleak howling wilderness, fit home for the whistling heat-laden dust-storm, which often sweeps across its surface.' Millet, the second great important crop, is mainly a dry crop and is the staple product of the Cis-Indus tract. As in other parts of North-Western India, there are two harvests in this region, the Rabi and Kharif.

3. **Communications.**—One of the great railway highways of India—from Calcutta to Delhi and Peshawar —runs right across the northern part of this area. Crossing the Jhelum River at Jhelum, it runs across the Plateau to Rawalpindi, crosses the Indus where that river runs through a narrow gorge near Attock and up the Vale of Peshawar to Peshawar. Above Peshawar lies the famous Khyber Pass, the gate to Afghanistan. A narrow gorge surrounded by high hills from which the wild Afghan tribesmen were wont to fire upon the helpless traveller, the Khyber Pass has had a great importance in Indian history. Some years ago a military road was constructed through the pass, protected by troops. Now all is changed and a wonderful mountain railway threads its way through the narrow pass. Notice also the railway running along the east bank of the Indus, from which there are branches into the valleys of Kohat and the Kurram Valley and into Bannu Plain. The map, Fig. 110, shows these railways and also how the railway through Kohat runs right to the frontier, and towards the east connects directly with Peshawar. Railways

such as this, running to the frontier, are called 'strategic' railways. They are built, mainly for military reasons. In case of trouble on the frontier, soldiers and supplies can quickly be sent from the plains to the frontier stations. In times past the wild tribes of the hills used to descend to the plains and there rob and kill the peaceful people in their villages. Now the frontier is carefully guarded and the people are protected from danger.

4. **Towns.**—*Peshawar* is the most important town of the North-West Frontier Province. It is the centre of the rich irrigated plain and the head-quarters of local Government. It controls the Khyber Pass, and nearly all the trade through the pass to Afghanistan comes through Peshawar. Peshawar is at one end of the route; at other end is Kabul, the capital of Afghanistan.

In April 1938 a very important scheme was completed for supplying Peshawar and district with cheap electric power. Water from the Swat River is taken through a tunnel 2¼ miles long under the Malakand Pass and then made to work the great turbines and generate electricity.

*Kohat, Bannu* and *Dera Ismail Khan* are the natural centres of their respective valleys or plains and are all military as well as trade centres.

### QUESTIONS AND EXERCISES

1. Compare and contrast this region with the Punjab Plains (Chapter XIX).

2. How are the railways of the North-Western Hills limited by physical features?

3. Give an account of the Vale of Peshawar.

4. Write an account of the climate of the North-West Frontier Province.

# CHAPTER XVIII

## BALUCHISTAN

1. **General Features.**—Baluchistan lies outside the Mountain Wall of India and outside the influence of the Monsoon. It is a very dry plateau and large parts are almost rainless. It comprises several Districts (the most fertile parts), the large Native State of Kalat and a number of smaller States. The whole of Baluchistan forms one natural region. This region is like the Tibetan Plateau in many ways. It is also a dry, barren region and is cut off from the rest of India by ranges of mountains—the Sulaiman and Khirthar Ranges. But the Plateau of Baluchistan is not nearly so high as the Plateau of Tibet; its average height is only from 1,000 to 3,000 feet above sea-level instead of over 12,000. So it is not nearly so cold.

Baluchistan is not a flat-topped table-land, but a table-land with a very rugged surface. It is best described as a wild, mountainous country with many deserts. The rainfall is very small and does not, on an average, exceed eight inches in the year. There are no large rivers which can be used for irrigation as there are in the Punjab, but only short rushing torrents which flow after rain but are often dry for many months of the year. The rain falls mainly during storms in the cold season. Just like the dry regions of the Punjab, Baluchistan is very hot in the Hot Season and very cold in the Cold Season (see Figs. 20 and 21). So cold is it in the Cold Season that snow falls instead of rain in the higher parts.

One more curious thing about Baluchistan we must notice. Except near the coast, the rivers do not flow to the sea like nearly all the rivers of India, but they

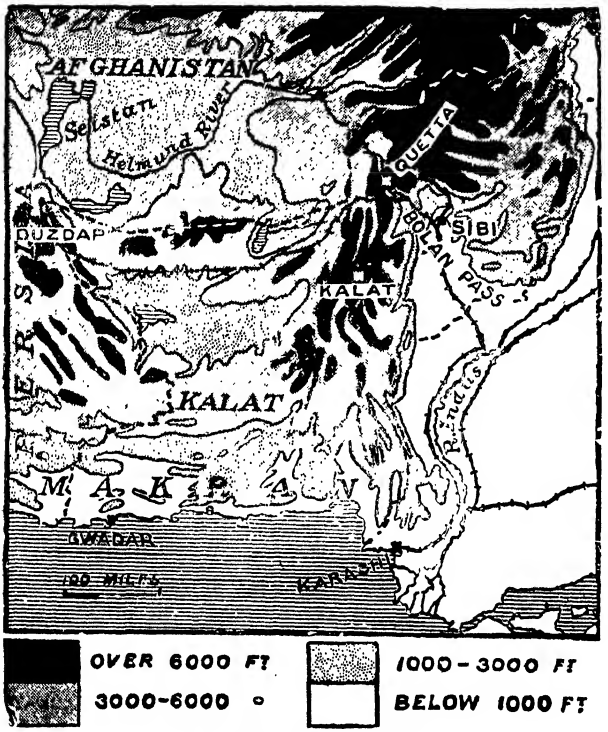



Fig. 113. Baluchistan

flow into shallow lakes in the midst of the Plateau. The lakes themselves often dry up entirely in the hot weather.

2. **People.**—With the lack of water and the great extremes of heat and cold and the difficulty of growing

sufficient crops for food Baluchistan is not a pleasant country in which to live. Although Baluchistan is nearly as large as the whole of the Punjab, there are fewer people living there than in the city of Bombay. The whole population is only 870,000. If we could spread these people out equally all over the country there would only be six people to every square mile—far less than in any other part of India. In the Punjab there are nearly 200 people to every square mile and in the Ganges Delta there are 600. The people are nearly all *nomads*, that is, people who have no fixed home, but are always on the move. There are three principal races—the Brahuis, Balochi (or Biluchi) and Pathans—speaking different languages. The Brahuis hate the scorching heat and in the hot weather go into the mountains, driving before them their thousands of sheep and goats, their horses, cattle, and camels. In the cold weather they come back to the flat alluvial plains to find pasture for their flocks and herds there. In bad seasons, and often for every winter, many Brahui families march to Sind, returning in the spring. In Baluchistan there are two main reasons why the people are nomads or wanderers. One is the great extremes of heat and cold. The other is the lack of land which can be cultivated or irrigated to furnish food for man and beast and so the people have to wander from place to place finding pasture. In summer they live in 'jhuggi', or shelters made of branches, or in 'kizhdi', tents made of goat's hair matting or of blankets. In winter they may live in the mud huts of the villages. These huts have walls of straw and mud, with rafters of wood (if possible) and covered with matting of dried palm-leaves or tamarisk. It is only in the towns that we find buildings made of mud-bricks dried in the sun,

3. **Irrigation.**—Although there are no large rivers which can be used for irrigation, the soil in the valleys is often very fertile and the people try very hard to bring water to it. The water from the snowfall on the mountains sinks into the ground at the foot of the hills and the people dig long tunnels called 'karez' to get this underground water. Karez are common in Persia, but we do not find them in other parts of India. Land irrigated in this way is only found in a few parts of Baluchistan, but especially near Quetta, in the districts of Quetta-Pishin. Here the people are Pathans. A few of the level tracts of alluvium in Baluchistan are irrigated by flood water from the streams. In good seasons, as many as three crops may be grown on the same piece of land. This is done by the Jatts, who live in the district of Kachhi. The most important crop is *jowar* (millet). Another crop is wheat, and fodder is grown for the cattle and sheep.

Along the sea-coast, in Makran, there are a few fishermen but further inland, dates provide food for man and beast for most of the year.

Although there are so few people in Baluchistan, they do not all speak the same language. The most important languages are Balochi, Pashto, and Dehwari; all of them are Iranian languages and quite different from our Indian languages. Another language, Jatki, is growing in importance.

The people of Baluchistan are mainly Muslims. There are more men than women and so it sometimes happens that a woman has more than one husband. The population is not increasing and large numbers of the children die.

There are really no towns in Baluchistan. Quetta and Sibi are both of British origin. Notice very

carefully the position of Quetta at the head of the Bolan Pass. The Bolan Pass is by far the easiest route between Baluchistan and India. There is another route along the coast. Quetta was destroyed by earthquake in 1935 but has been rebuilt.

Across the deserts of Baluchistan there are numbers of old camel caravan routes. One of the most important of these routes, running along the north of the country and far into Persia, was replaced by a railway, finished in 1919 to just within the Persian border. It is now disused and motor transport is more important.

## QUESTIONS AND EXERCISES

1. Compare and contrast the Baluchistan Plateau with the Punjab Plains (Chapter XIX).
2. Describe the irrigation practised in Baluchistan.
3. Write an account of a year in the life of a Brahui man, living in Baluchistan.
4. Draw a sketch-map showing the importance of the position of Quetta.
5. Do you think the Baluchistan Plateau will ever become very important? Give your reasons fully.
6. What is meant by inland drainage? How do you explain it?

# CHAPTER XIX

## THE PUNJAB

### I. THE PROVINCE

The Punjab is now (since August 1947) divided into East Punjab forming part of the Indian Union and West Punjab forming part of the Dominion of Pakistan. Although it lies in the dry north-west, it is very important. It has benefited enormously by the great irrigation works carried out by the Government. Punjab means 'five waters' and the Punjab is, strictly, the land of the five rivers—the Jhelum, Chenab, Ravi, Bias and Sutlej. But the province extends beyond this area; it includes the land between the Jhelum and the Indus, as well as part of the land between the Sutlej and the Jumna and part of the Himalayas. Included in the province are a number of Native States, and the whole is larger than the United Provinces and nearly as large as the Madras Presidency. The population is roughly 24,000,000. The most important Native States are those of Patiala, Jind and Nabha, the three Phulkian States.

The greater, and the most important, part of the Punjab forms a portion of the great Plain of Northern India and will be described under the name of the Punjab Plain. In the north-west is a dry plateau or hilly region which forms a part of the North-West Dry Hills region. The north-eastern part includes portions of the Himalayan and Sub-Himalayan Regions while the south-east borders the Thar Desert.

### II. THE NORTH-WESTERN DRY HILLS REGION

This includes most of the Punjab lying between the Jhelum and the Indus—the Districts of Jhelum,

Rawalpindi and Attock. It is a dry sandy plateau bounded on the south by the Salt Range. The most important crop is millet, which depends mainly on the scanty rainfall. There are two oilfields at Khaur and Dhulian near Attock and salt is mined in the Salt Range. The principal town is *Rawalpindi,* at the foot of the Himalayas, from which a road runs to the hill station of Murree and to the heart of Kashmir. Notice too the important position of Rawalpindi in connection with railway routes; the railway works of the North-Western Railway are at Rawalpindi. *Jhelum,* on the borders of the North-Western Hills and the Punjab Plains is a depot for the Kashmir timber trade.

## III. THE HIMALAYAN AND SUB-HIMALAYAN REGION

For a general description of these regions see under Kashmir. Only the north of the Punjab projects into these regions. On a spur of the Himalayas near the plains, lies Simla, the seat of Government of East Punjab. It is 7,000 feet above sea-level and is reached by a wonderful Mountain Railway. Where the great rivers of the Punjab leave the Sub-Himalayan Regions, are the great irrigation works, where the water of the rivers is tapped and directed into the irrigation canals. The Punjab as a whole is very short of timber, and efforts have been made to work the fine timbers of the Himalayas. The most valuable are the deodar and the blue pine. The chir pine is also used. The timber is floated down to saw-mills on the plains.

## IV. THE PUNJAB PLAINS

1. **General Features.**—The word 'punjab' or 'panjab' is a Persian word meaning 'five waters' or 'five rivers'. The Punjab Plains are really the valley plains

of the five rivers—Jhelum, Chenab, Ravi, Bias and Sutlej. These five rivers flow from the great Mountain Wall

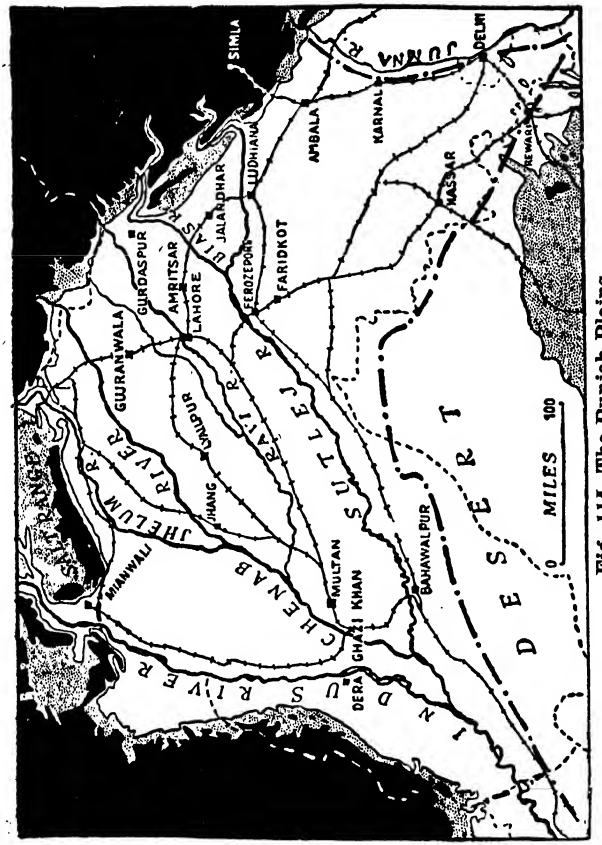



**Fig. 114. The Punjab Plains**

Land over 1,000 feet dotted; land over 3,000 feet black.

in a south-westerly direction, and all five join to form one river which then joins the River Indus in the south-west corner of the Punjab. Look at Fig. 114 and

notice carefully the course of the Punjab rivers. In the dry season the rivers of the Punjab are shallow and slow but in the rainy season, when the warm sun has melted the snows on the mountains and the monsoon rains are pouring down on the Himalayan slopes, the rivers become rushing torrents, often miles wide. The rush of the water does not always follow the same channel. The river may leave its old bed, and in a single night destroy miles of fertile fields cutting for itself a new channel. Between the rivers there is usually a flat, alluvial plain (called a 'doab') covered with cultivated fields. Sometimes the land rises a little between the rivers and is then very dry and covered with scrub. The regions near the Himalayas sometimes suffer from severe earthquakes.

2. **Climate.**—The Punjab Plain is a dry region. On the north-west it is sharply marked off from the hills by the Salt Range and in the north-east it stretches to the foot of the Himalayas. But to the south it is not divided off by a sharp line. South of the Sutlej River the land begins to rise very gradually and becomes drier and drier till it passes into the barren waste of the Desert Region. But there is no place where you can say 'Here the desert begins and the Punjab Plain ends'. If we travel eastwards across the Punjab Plain we do not come to any hills but we find that we cross a line after which all the rivers and streams flow eastwards to join the River Jumna and not westwards to join the Sutlej. This water-parting marks the dividing line between the two great river basins of Northern India—the basin of the Indus and the basin of the Ganges. This line divides the Punjab Plain from the Upper Ganges Plain.

Throughout the great Punjab Plain there is no hill at all, it is very nearly flat and only slopes very gently

from the foot of the mountains towards the south-west.

In Chapters IV and V we learned that this Dry Region is particularly hot in the months of May, June and July, because it receives no cooling sea-breeze and the sun shines brilliantly on its level plains. We learned also that in the months of December and January the Punjab Plain is cooler, generally speaking, than other lowland parts of India, because level plains which are far away from the sea, cool very quickly.

When we were studying the rainfall map in Chapter VI we saw that the whole of this region gets less than 40 inches of rain in the whole year. The driest part is in the south-west and receives less than 5 inches, whilst the wettest parts are near the mountains. Why should this be so?

3. **Irrigation.**—As a result of the small amount of rain, falling during one part of the year only, the Punjab Plain would be a very barren region if man had not worked very hard to improve it. In the Punjab there are three principal ways of irrigating the land—

(*a*) by wells. There is often water underground even when the surface of the land is dry. This underground water can be reached by wells. Figs. 53 to 55 showed how this type of irrigation is carried out.

(*b*) by inundation canals. When the rivers are in flood some of the water is drawn off into canals, but later in the year these canals dry up.

(*c*) by permanent irrigation canals. These are by far the most important because they have water in them for the whole of the year.

From earliest times, the kings, rulers and people of the Punjab have built and used wells and canals in order to provide themselves with water. Since India

became part of the British Empire, the Government has spent enormous sums of money in improving old canals and especially building new ones. In the whole of the Punjab, which you must remember includes a large area of hills and mountains, over 13 million acres are irrigated or 51 per cent of the whole. No less than 60 per cent of the plains are irrigated.

4. **Sub-divisions.**—We find we can divide the Punjab Plain into three separate areas or sub-regions.

(*a*) The North-Eastern Plain. This is the wettest part (near the foot of the mountains) and has a rain-

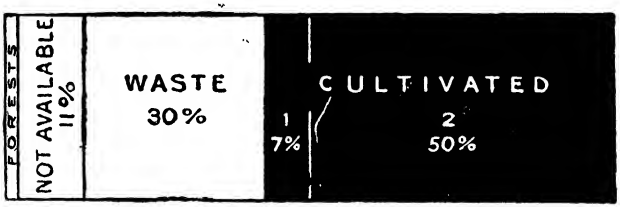



**Fig. 115. Cultivated land, Punjab Plains**

fall of between 25 and 30 inches and there is a moderate rainfall in the cold season. A very large number of wells are found in this region and it is possible to grow many crops without canal irrigation.

(*b*) The South-Central Plain. This is the driest part and the usual rainfall is only from 5 to 10 inches. It is almost impossible to grow anything without irrigation.

(*c*) The South-Eastern Plain. Here the rainfall is from 20 to 30 inches but it varies very much from year to year. In good years many dry crops can be grown, but in bad years none.

These three divisions of the Punjab Plains are marked in Fig. 116.

5. **Canals.**—Fig. 119 shows what a large proportion of the crops in the Punjab Plain are irrigated. Especially in the south-west nearly all the crops depend on Government canals.

In the Punjab Plains there are six very large and important canal systems. The principal canals are

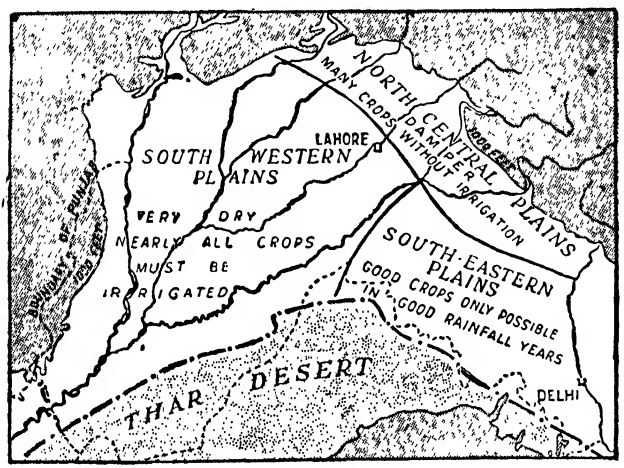



**Fig. 116. The three divisions of the Punjab Plain**

N. Central Division; S.-W. Division; S.-E. Division.

marked on Fig. 117. Study this map carefully and notice the big main canals and then the branches or distributaries. These are the main canal systems.

(*a*) The Western Jumna Canal takes the water from the Jumna, near where the river leaves the Himalaya Mountains. This is an old canal which has now been rebuilt and much improved.

(*b*) The Sirhind Canal takes its water from the Sutlej River at Rupar and like the Western Jumna

Canal it waters the south-eastern part of the Punjab Plain.

(*c*) The Upper Bari Doab Canal takes its water from the Ravi River from near Madhapur, where the river leaves the Himalaya Mountains. It waters the Bari Doab, or the region between the Ravi and Bias Rivers.

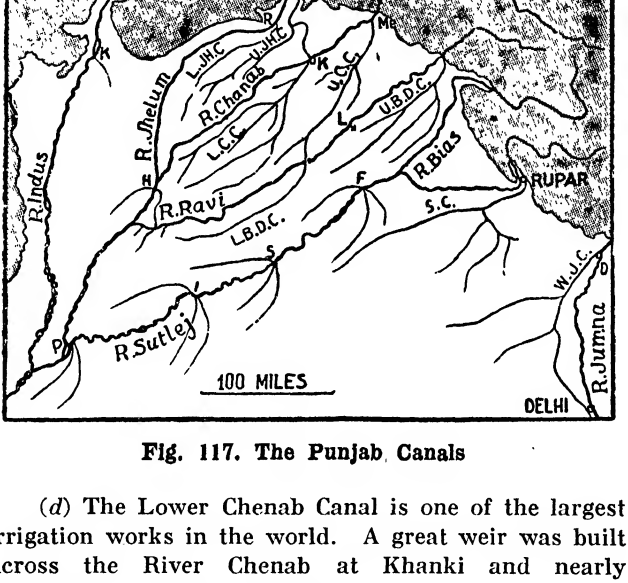


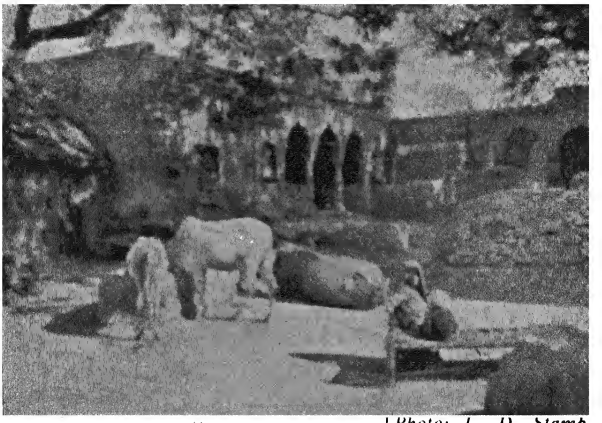

**Fig. 117. The Punjab Canals**

(*d*) The Lower Chenab Canal is one of the largest irrigation works in the world. A great weir was built across the River Chenab at Khanki and nearly 2½ million acres are irrigated.

(*e*) The Lower Jhelum Canal takes its water from the Jhelum at Rasul.

(*f*) The Upper Chenab—Lower Bari Doab Canal System. This system, also known as the 'Triple Project', is one of the cleverest examples of irrigation in

the world. The Upper Chenab Canal takes its water from the Chenab at Merala, at the foot of the Himalayas. The main canal is carried by an 'aqueduct', or water-bridge, across the Ravi River and then becomes the Lower Bari Doab Canal. But when this scheme was arranged, it was found that so much water would be taken by the Upper Chenab Canal that none would be left for the Lower Chenab Canal. And so the



[*Photo: L. D. Stamp*

**Fig. 118. Inside a Punjab village**

Upper Jhelum Canal was built, which brings water from the Jhelum at Mangla to the Chenab at Khanki and helps to fill the Lower Chenab Canal. Hence the name of Triple Project.

(*g*) The New Sutlej Valley Canals. This interlinked group forms the most extensive project of canal systems of India. Four weirs have been built in the Sutlej Valley to feed the eleven canals that take off from them. Three of these weirs are on the Sutlej near Ferozepur, Sulemanki and Islam; while the fourth one is at Panjnad on the combined Sutlej and

Chenab rivers. Over 5 million acres of otherwise barren land will be irrigated by this system, 2 million in the Punjab and three million acres in the States of Bahawalpur and Bikaner. It is estimated that crops worth about 300 million rupees will be produced per year in the irrigated areas.

(*h*) Haveli Project. In spite of the fact that there is a network of canals in the Punjab the districts of Multan, Jhang and Muzaffargarh were either left dry or had a precarious irrigation from inundation canals. To afford them a perennial irrigation Emerson Barrage has been built at Haveli Bahadurshah, ten miles below the confluence of the Jhelum and the Chenab. Two canals take off, one from the right bank supplies water to the district of Muzaffargarh, and the second from the left bank irrigating parts of the Multan and Jhang districts. These canals will irrigate about 5½ million acres—about 5 million acres will get the benefit of perennial irrigation, while the remaining half a million acres will have almost a sure supply of water for at least six months in the year. The Sidhnai canals have also benefited by this project, because the surplus water of the left-bank canal has been poured into the Ravi a few miles above the Sidhnai Weir.

(*i*) Canals under consideration. The *Thal Project* aims at irrigating the *Thal* area lying between the Indus and the Jhelum. Construction work of the Weir near Kalabagh on the Indus was begun in 1939 but had later to be postponed. The *Bhakhra Dam* on the Sutlej, a few miles above Rupar, is contemplated for supplying water to the districts of Rohtak and Hissar, besides producing hydro-electricity.

Some of these great dams are now being made to yield a new source of wealth—electric power, produced by allowing some of the water to fall rapidly down a

series of great pipes on to turbines, like great water-wheels. These rotating turbines drive dynamos which create the electric current. The most important of these works is the Uhl river scheme, which was completed in 1933. The water of the river Uhl, a tributary of the Bias in Mandi State, is diverted and taken through an artificial tunnel 2½ miles long, at the end of which it drops 1,800 feet to the Power Station. The electric current generated is distributed by cables to such distant places as Lahore and Ferozepur.

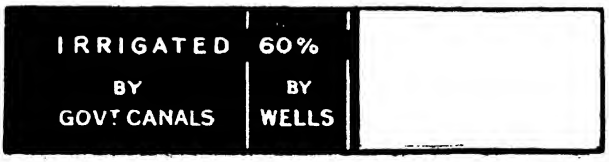



**Fig. 119. Proportion of crops irrigated, Punjab Plains**

Irrigated crops in black.

**6. Crops.**—Fig. 120 shows that the most important crop of the Punjab Plains is wheat—occupying nearly one-third of the whole cultivated area. Another important crop is millet, often grown on the same ground as wheat, the wheat being reaped in the Spring and the millet in the Autumn. Much millet is also grown as a 'dry' crop where wheat cannot be grown. Wheat and millet together with maize, form the staple food of the people. Owing to the splendid irrigation works in the Punjab, more wheat can sometimes be grown than the people require. Wheat is the principal food of many of the peoples of Europe where they cannot grow enough for themselves. So in some years a quantity of wheat is sent to the port of Karachi and from there by boat to Europe. Barley is another important crop and some of it is exported in the same

way. Another crop grown largely for export is oil-seeds. A considerable quantity of sugar-cane is grown in the north-eastern part of the Punjab Plain. By far the most important crop not grown for food is cotton. On the irrigated land of the Punjab much of the long-stapled American cotton is grown (see Chapter IX) and exported through Karachi.

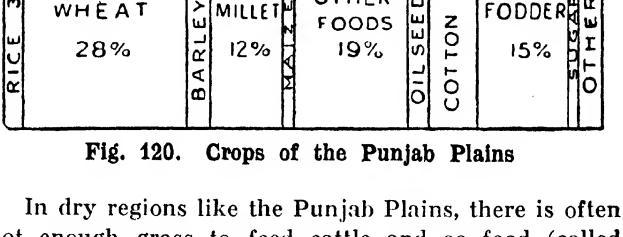
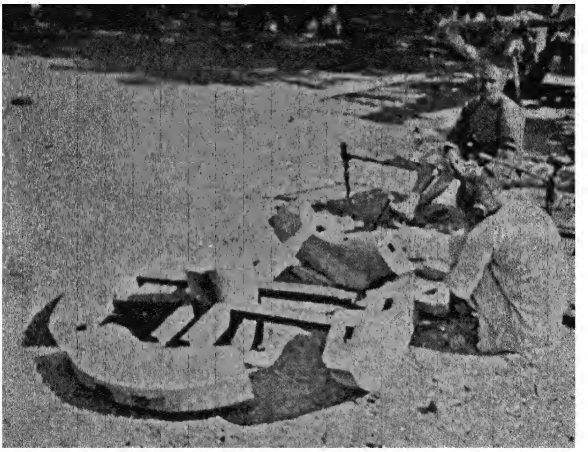



**Fig. 120. Crops of the Punjab Plains**

In dry regions like the Punjab Plains, there is often not enough grass to feed cattle and so food (called 'fodder') has to be grown for them. Fodder is an important crop because the cattle must be kept for ploughing. There are large numbers of sheep and goats in this region. They live on the poor scrubland which is not enough for cattle.

7. **People and Towns.**—The larger number of the people in this natural region are engaged in agriculture. They live in small villages, scattered over the plains. Their huts are built of mud, or mud and wattle, for there is little or no stone in the great alluvial plain. The roofs of the huts are flat (since there is little rain to run off) and made of rough branches coated with mud. In some parts of the world we find agriculture is carried on from isolated houses, or 'farms', each house being some distance from the next. This is the case in Europe and America and also in the Ganges Delta. But in days gone by the peaceful

cultivators of the Punjab suffered much from robbers who swept down upon them from the hills and so they lived together in villages for greater safety. In this region the people have not changed their habits and still live together in small villages. Out of every 1,000 people in this region only about 120 live in towns of more than 5,000 inhabitants. In the Punjab Plains



[*Photo : L. D. Stamp*

**Fig. 121. Village industries—the wheelwright**

there are only seven towns with more than 50,000 people, and several of these are becoming smaller rather than larger. The largest and most important city is, of course, Delhi, the capital of Indian Union which we must study separately. We can divide the other cities into two groups.

(*a*) The great cities of the past: famous religious centres or ancient capitals, such as Lahore, Amritsar (the old Sikh religious centre) and Multan.

(*b*) Cities of modern origin or old cities which have adapted themselves to modern needs and form collecting stations for agricultural produce or have developed manufactures of their own, such as Ambala, Lyallpur and Gujranwala.

*Lahore* is still the largest city of the province and the capital of West Punjab. It is an important railway centre and no less than 30,000 people are supported by the railway industry.

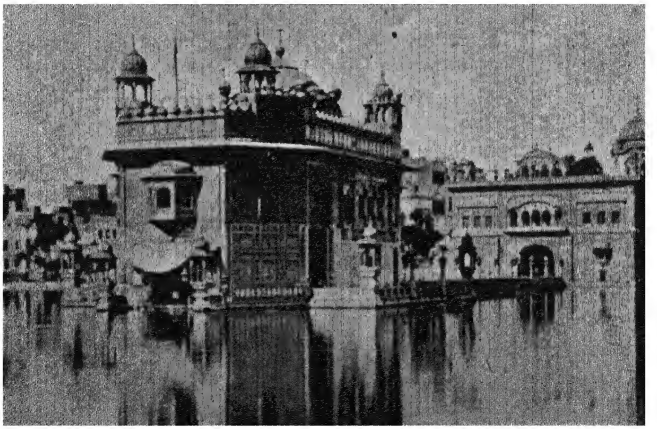


**Fig. 122. A view of Amritsar**

*Amritsar* is a newer town than Lahore. During the eighteenth century it was the stronghold of the Sikhs who stood out against the Muslims. It suffers badly from fever, largely due to stagnant water which soaks into the surrounding hollow from the Upper Bari Doab Canal. It manufactures carpets and has other small manufactures but they are less important than formerly.

*Multan* is the natural collecting centre for the south-west of the Punjab. It is a very old town, with old local industries. Afghan traders visit the town (see the map for the routes by which they come) and exchange their raw silk, fruits and spices for piece-goods.

*Lyallpur* is a fine new town with a large wheat trade, the wheat being collected and sent to Karachi. It also has cotton mills.

*Ludhiana* manufactures cotton fabrics.

*Gujranwala* is an active trade centre.

*Ambala* is a modern town, of British origin, and a railway junction.

*Montgomery, Sialkot,* and *Gujerat* are other towns which should be noted.

In the south-east the Punjab stretches across the Indus River to the Sulaiman Range. Dera Ghazi Khan is the chief centre on the western side of the Indus.

Amongst the important Punjab States should be noted *Patiala* (with its capital Patiala, a large town and trade centre for the south-eastern Punjab), *Bahawalpur* (bordering on the Thar Desert), *Kapurthala, Mandi, Jind* and others.

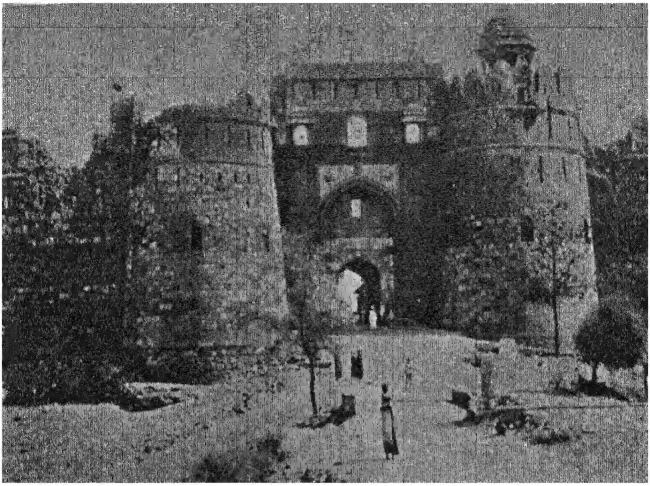


**Fig. 123. One of the gateways into Old Delhi**

# CHAPTER XX

## DELHI

Delhi, the capital of the Indian Union, is a large city of nearly 450,000 inhabitants—the sixth largest city in India. It owes its importance largely to what we call the 'strategic' character of its position. Fig. 124 shows that Delhi stands at the head of both the great plains —the fertile plains of the Ganges and the plains of the Punjab. Just to the west of the River Jumna on which Delhi stands is a low sandstone ridge which divides the two great basins. From Delhi any place in these great plains is easily reached. In days gone by, India was invaded many times from the north-west. The invaders had to pass through or near Delhi on the way: they could not go to the north because they were shut in by the Himalaya Mountains, they could not go

to the south for there is the great barren waste of the great Indian Desert; or the hilly dry lands of the Central Indian Plateau. So, in the past, Delhi has often been the capital of India. From it the rulers could easily reach and control all parts, but especially the fertile valley regions. Now also Delhi is the capital of India and the New Delhi is the seventh city to be

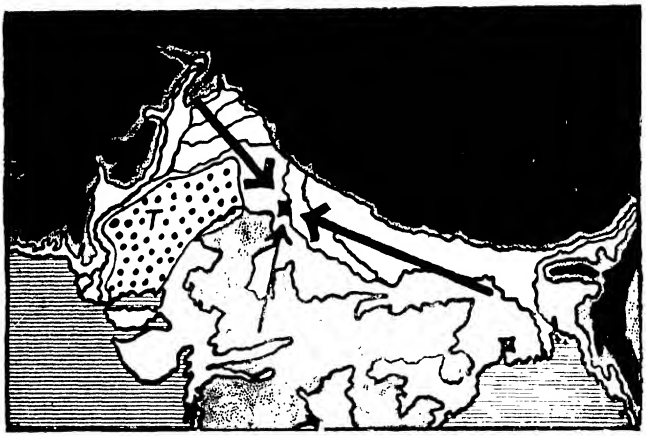
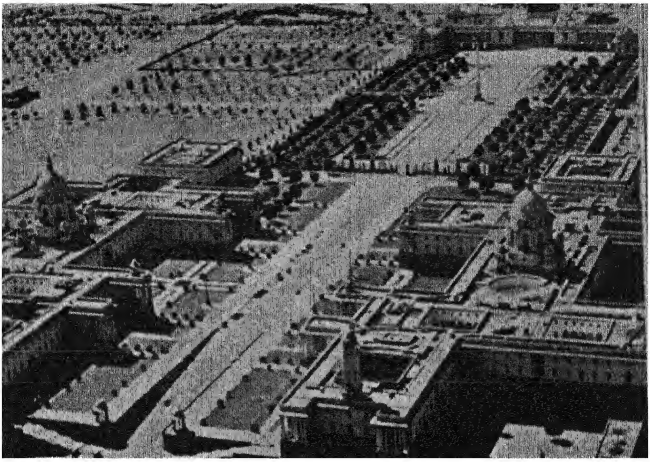



**Fig. 124. The position of Delhi**

T, The Thar Desert. Land over 1,000 feet dotted; over 3,000 feet black.

built. Owing to irrigation, the lands round about are fertile and covered with crops. Much cotton is grown and finds its way to Delhi where cotton manufacture is carried on. Standing on the Jumna, Delhi is at the 'head of navigation' of that great river and boats can go all the way from Delhi to Calcutta. Just below Delhi there is a great dam across the Jumna River (see Fig. 50). The land routes from the north-west there joined the water routes of the north-east. In modern



[*Photo: Indian Air Survey Co. Ltd.*

**Fig. 125. Air view over the Government of India Buildings of New Delhi**

Viceroy's House in the background, Secretariat buildings on the left and right.

times railways have largely replaced the land and river routes, and Delhi has become a great railway centre, easily reached from all parts of India. At a convenient distance to the north, on the healthy heights of the Himalayas is Simla. Until recently, during the hot weather, the Government of India moved from Delhi to Simla.

Since Delhi was made the capital of India, a small tract of land including the city has been made into a separate province.

The city of Old Delhi, surrounded by a wall (see Fig. 123) stands on the banks of the Jumna and is famed for its fort and great mosque—the largest in the world. The city of New Delhi has been built since Delhi was chosen in 1912 to be India's capital. It is perhaps the city with the most beautiful buildings in

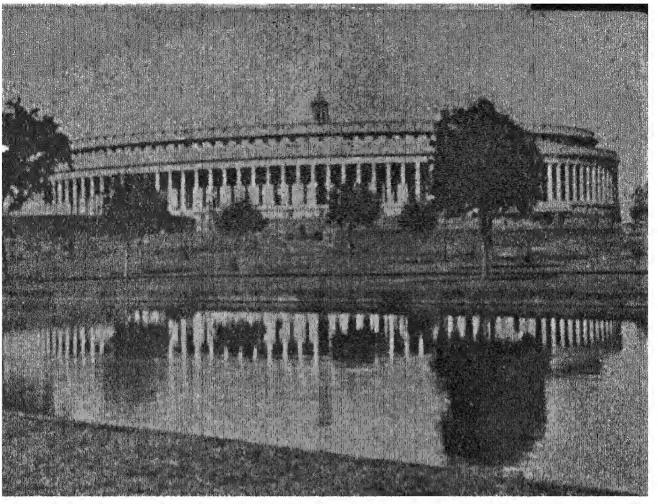


**Fig. 126. The Council Chamber, New Delhi**

the world. One is the house, Viceregal Lodge, in which the Viceroy lives. Near at hand can be seen the ruins of the five olden Delhis.

### QUESTIONS AND EXERCISES

1. Write a description, with sketches, of a Punjab village, giving reasons why things are as you describe them.

2. Compare the irrigation of (*a*) Baluchistan, (*b*) Sind, and (*c*) the Punjab

3. Write an account, with sketch-maps, of the hinterland of Karachi, showing the products and how they reach the port.

4. What is the 'Triple Project'? Show by sketches how it operates.

5. Write an essay on Delhi.

# CHAPTER XXI

## THE UNITED PROVINCES

### I. THE PROVINCE

The United Provinces of Agra and Oudh have a smaller area than the Punjab, but have nearly twice as many people. The population is denser than in any province of India except Bengal. Yet a large part of the United Provinces has a rainfall of less than 40 inches and its prosperity is largely due to the great irrigation works. The north-western part of the United Provinces stretches into the Himalayan and Sub-Himalayan regions (compare the Punjab) and a small strip along the south forms part of the slope from the Central Indian Plateau where Jhansi is the centre. But the largest part of the Provinces lies in the great Ganges Plain. The area west of Allahabad receives less than 40 inches of rain in a year and so forms a natural region which we may call the Upper Ganges Valley or Dry Belt. The region east of Allahabad forms half of the Middle Ganges Valley, of which the other half lies in the Province of Bihar.

### II. THE HIMALAYAN REGION

For a general account of this region, reference should be made to the details given under the State of Nepal. The lower hills, in the Sub-Himalayan region, are unhealthy and so a number of hill stations have been built on the more accessible parts of the Himalayan region. Examples are Mussoorie (see Fig. 104) and

Naini Tal. The Himalayan Giant, Nanda Devi, is in the United Provinces.

## III. THE SUB-HIMALAYAN REGION

It is in the United Provinces that great extensions of cultivation have been made in recent years into the Sub-Himalayan region. Dehra Dun is one of the head-quarters of the Forest Department in India. A famous and sacred place is Hardwar, where the Ganges leaves the mountains. A line of towns has sprung up on the borders of this region and the Ganges Plain—like frontier towns from which the cultivators have attacked the unhealthy foothills. Examples are Saharanpur, Philibhit, Kheri, etc.

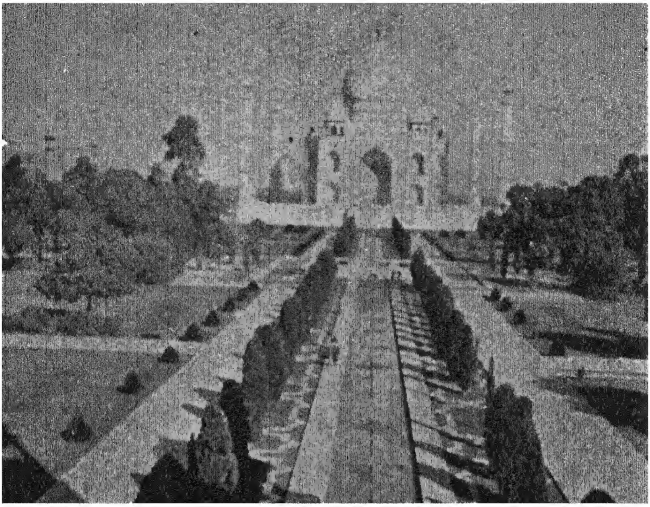
## IV. THE UPPER GANGES VALLEY

**1. General Features.**—At the end of the last chapter we learnt something of the position of Delhi, which stands at the head of both the Indus Basin and the Ganges Basin. West of Delhi all the streams flow westwards to join the River Indus; east of Delhi all streams flow eastwards to join the Ganges. There is no barrier of mountains between the two regions—the Punjab Plains and the Upper Ganges Valley. The Upper Ganges Valley forms another part of the Great Plains of northern India and does not differ greatly from the Punjab. It is another dry region but not so dry as the Punjab. The rainfall map of India (Fig. 41) shows that the driest region of all (less than 5 inches) is in the south-west corner of the Punjab Plains. As we travel down the Ganges Valley from Delhi, it gradually becomes damper and damper. The 40-inch rainfall line passes through the town of Allahabad and we take this line as the eastern limit of the dry region of the Upper Ganges Valley. This region is not quite

so hot as the Punjab in the hot season and not quite

Fig. 127. The Ganges Plain, showing the limits of the Provinces of Bengal, Bihar and the United Provinces

so cold in the cold season. The annual range of temperature gets less and less, as we travel down the



[*Photo*: *L. D. Stamp*

**Fig. 128. The Taj Mahal, Agra**

A memorial built by the Moghul Emperor Shah Jahan in memory of his wife.

Ganges Valley to the wetter regions near the Bay of Bengal.

2. **Physical Features.**—Looking at Fig. 129, we see that about the centre of the region the River Ganges flows in a south-easterly direction. It enters the region from the Himalayan mountains near Hardwar and leaves it in the south-east at Allahabad. Forming roughly the western, and later the southern boundary of the region is the River Jumna, on which Delhi stands. It too rises in the Himalaya Mountains and flows for a long distance southwards but gradually turns south-eastwards—where it divides the Ganges Plain from the slopes of Central Indian Foreland (Chapter XXXIII) finally joining the River Ganges at Allahabad. A great part of the Upper Ganges Valley

is formed, then, by, the Ganges-Jumna Doab (or country between two rivers). North-east of the River Ganges there is a broad strip of country where the

**Fig. 129. The Upper Ganges Valley**

All land over 1,000 feet black. Look in your atlas and notice the very many railways in this part of India and also where they run.

rainfall is less than 40 inches in a year, and then another strip where it is slightly more than 40 inches, before we reach the Sub-Himalayan Region. Although in this northern part the rainfall is slightly greater than in the Doab, the crops grown are like those in

other parts of the Dry Region and so we may say the Dry Region stretches over the whole Ganges Plain from the Sub-Himalayan Region, as far east as the Gogra River on the north to the River Jumna on the south. Over the whole of this country there is no hill at all; it is one great plain sloping very gently from Delhi

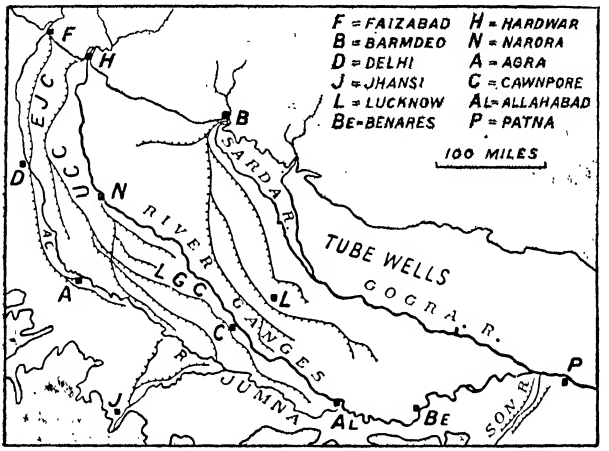



**Fig. 130. The irrigation canals of the Upper Ganges Valley**

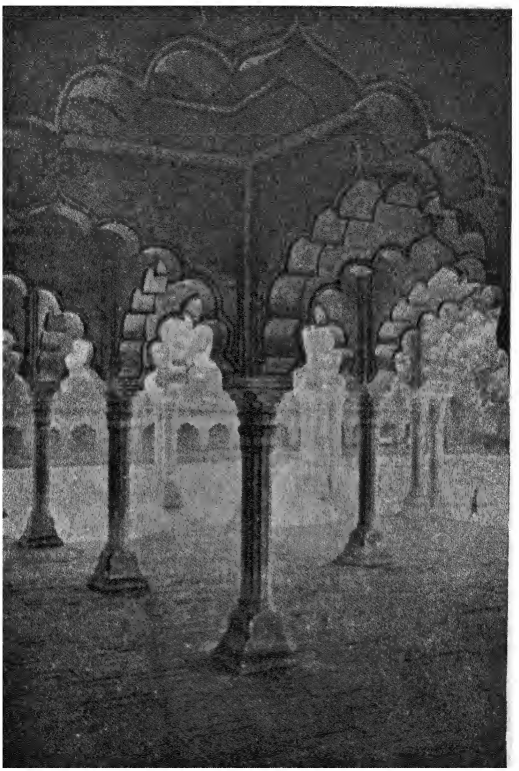
Land over 1,000 feet dotted.

(700 feet) or Saharanpur (about 800 feet above sea-level) to Allahabad (400 feet).

3. **Canals.**—In the Upper Ganges Valley there are five very large and important canal systems (see Fig.130).

(*a*) The Eastern Jumna Canal which takes the water from the Jumna River near Faizabad, just where the River Jumna comes down from the Himalaya Mountains.

(*b*) The Agra Canal which takes the water from the Jumna river just below Delhi (see Figs. 49 and 50)



[*Photo : L. D. Stamp*

**Fig. 131. In the old Fort, Agra**

An example of the magnificent architecture found in many of the old palaces of India. Built by the Emperor Akbar.

and waters the land south-west of the Jumna River between Delhi and Agra.

(*c*) The Upper Ganges Canal which takes the water from the Ganges River near Hardwar, just where the River Ganges comes down from the Himalayas.

(*d*) The Lower Ganges Canal which takes the water from the River Ganges at Narora.

The Eastern Jumna and the two Ganges Canals irrigate the Ganges-Jumna Doab.

(*e*) The Sarda Canal which takes the water from the Sarda River near Baramdeo. There a great weir was built across the river in 1928 near where it leaves the Himalayas. The canal was completed in 1930 and

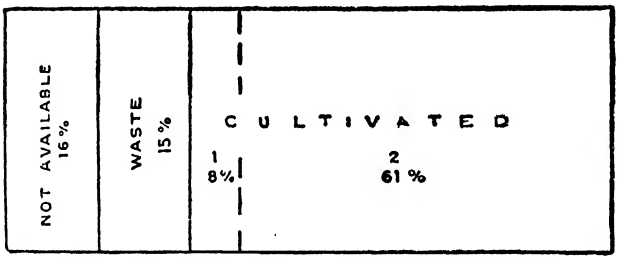



**Fig. 132. Proportion of cultivated land in the Upper Ganges Valley**

was designed to irrigate over one and a third million acres of land south-eastwards towards Lucknow, in the Doab between the Sarda River and the Ganges River.

Although this is such a dry region, the canals have made it very fertile. Look at the large proportion of cultivated land (Fig. 132) and the large proportion of the crops which are irrigated (Fig. 133).

Government has spent about 15 crores of rupees in the Upper Ganges Plain alone. If the canals were destroyed, thousands would perish of famine.

In addition to the land irrigated from the great canal systems, there are still vast numbers of wells usually

of the type shown in Figs. 53 and 54. In the northern part of the plain the Government is developing a great system of deep tube wells, pumped by electricity.

**4. Crops.**—There is another important result of irrigation. It allows much of the land to be 'double-cropped', that is, two crops are grown on the same piece of ground in one year. Wheat and barley are

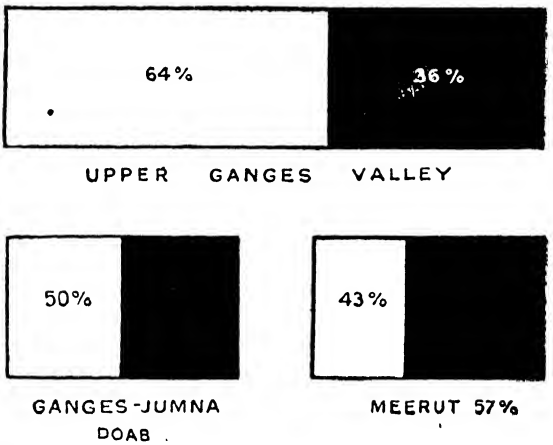



**Fig. 133. Proportion of irrigated crops in the Dry Region or Upper Ganges Valley**

Irrigated portion in black.

usually 'winter crops'; other crops can be grown on the same land in the hot season and the rains.

Now look at Fig. 138 (right hand column), the crops of the Upper Ganges Valley. Everywhere in this region wheat and barley occupy a larger area than rice. Nearly always, except just on the eastern borders, wheat alone is more important than rice. Some of the driest districts grow no rice at all. We must remember that wheat is the principal food of many of the

industrial peoples of Europe and in years of good crops some may be exported from this region. Another important food of the people themselves who live in the Dry Region of the Upper Ganges Valley is often millet, which forms a very important crop, second in importance only to wheat. Other food crops include maize, gram and various pulses. By far the most important crop not grown for food is cotton. Look again at Fig. 61 and note its distribution. Agra and Delhi are two important centres. The native Indian cottons are short-stapled and can be grown on land which is not irrigated. The much better long-stapled American varieties can be grown in India only on irrigated land and form an important part of the crop. Sugar-cane is grown in most parts of India but the most important region is the one we are now studying. Fig. 138 shows that sugar only occupies a moderate area when compared with other crops, but is rapidly becoming more important, and many sugar mills have been built recently. This is now practically the only province producing opium.

Fodder is an important crop because, for its size, the Upper Ganges Valley has more cattle than any other region of India. Both bullocks and buffaloes are very numerous. They are used for ploughing, but a large number of cows are kept for the sake of their milk. Aligarh and other districts are famous for their butter. There are not many sheep in this region. Sheep thrive in dry regions and can live on much poorer grass than cattle. Although this region is a dry one, it is so extensively cultivated that there is little waste land left on which sheep can be kept.

5. **People.**—The larger number of the people in this natural region are engaged in agriculture. They live in small villages, scattered over the plains. Their

huts are built of mud or mud and wattle, for there is no stone in the great alluvial plain. As in the Punjab, the people live together in small villages. Throughout this natural region, the people speak Hindi, and by far the larger number are Hindus. Out of every 1,000 people in this natural region, only about 120 live in towns of more than 5,000 people. In the Upper Ganges Valley there are only fourteen cities with more than 50,000 people, and many of these are becoming smaller rather than larger. We can divide the cities into two groups.

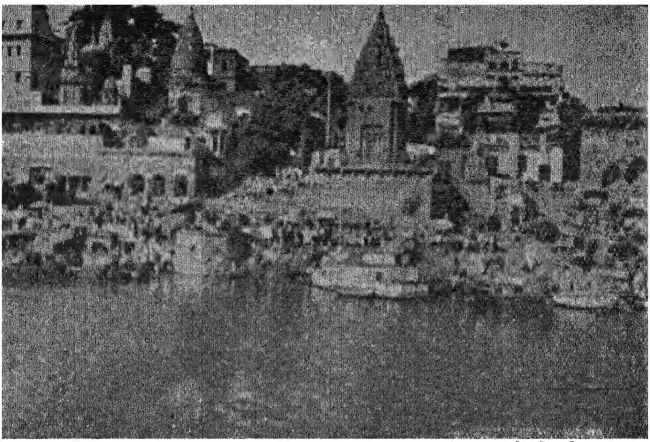
(*a*) The great cities of the past, famous religious centres or ancient capitals such as Lucknow, Allahabad and Muttra.

(*b*) Cities which have adapted themselves to modern needs and form collecting stations for agricultural produce or have developed manufactures of their own, such as Cawnpore, Meerut and Moradabad. Included here are the 'frontier' towns on the borders of the Sub-Himalayan Region. Saharanpur is the most important.

*Lucknow* is still the largest city of the province and an old capital. It is an important railway centre and has small manufactures, but is rapidly getting smaller.

*Allahabad,* situated at the junction of the Jumna and the sacred Ganges, is a very important place of pilgrimage. Its position at the junction of these two great waterways and now as a railway centre makes it an important collecting centre, but it has no manufactures of its own. It is the centre of Government of the United Provinces and a considerable proportion of its people are in Government employ.

*Muttra* on the Jumna, near the head of the Agra Canal, is an important religious centre.



(Photo : L. D. Stamp

**Fig. 134. The sacred River Ganges at Benares showing Hindu temples, bathing ghats and pilgrims**

*Farrukhabad* on the Ganges is an example of a place which used to be important owing to its situation on the great waterway, but the railways have now become the great arteries of trade and Farrukhabad is rapidly decreasing.

*Cawnpore* on the Ganges is one of the largest cities in the region. It is a great railway centre. It is the chief collecting station for the agricultural products of its own notable textiles.

*Meerut* and *Moradabad* are growing centres in the richest parts of the region. *Agra* has also important industries, but is specially famed for its ancient Fort (Fig. 131) and the Taj Mahal (Fig. 128).

Other big towns you should notice are *Bareilly, Aligarh, Rampur* and *Shahjahanpur.*

## V. THE MIDDLE GANGES VALLEY

This is a natural region lying partly in the United Provinces (east of Allahabad) and partly in Bihar.

It is damper than the Upper Ganges Valley and irrigation is less necessary. The wet region crop, rice, gradually becomes more important than wheat. When compared with the Upper Ganges Valley, there is more rain and a smaller annual range of temperature. We

**Fig. 135. The historic towns of the Ganges Valley**

All land over 1,000 feet dotted.

will describe the region in greater detail under Bihar. Taking the part which lies in the United Provinces, *Benares* is the largest town, an ancient centre of Hindu culture and a very sacred place of pilgrimage on the Ganges. *Mirzapur* and *Fyzabad* are neglected river-ports.

*Gorakhpur* is now a great collecting centre and railway centre for the northern part of the region.

Along the north this part of the United Provinces borders Nepal and a small strip of the United Provinces really lies in the Sub-Himalayan Region. There is a line of towns along the border, from which cultivation has been extended right to the Nepal frontier.

The United Provinces have no less than five universities—at Allahabad, Agra, Lucknow, Benares (Hindu) and Aligarh (Muslim.) At Dehra Dun is the Forest Research Institute.

### QUESTIONS AND EXERCISES

1. Describe the climate of the Upper Ganges Valley.
2. Draw a sketch-map of the Upper Ganges Valley showing separately the parts producing most rice and those producing most wheat. How do you explain this distribution of crops?
3. Give an account, with sketch-maps, of irrigation in the Upper Ganges Valley.
4. Draw sketch-maps from memory illustrating the position of Cawnpore, Allahabad, Delhi and Saharanpur.
5. Describe a journey from the Himalayan Mountain to the Central Indian Plateau.
6. Find another natural region in the world like the Upper Ganges Valley.
7. Compare a day in the life of a villager living in this natural region with a day in the life of a villager living in the Himalayan Region.

# CHAPTER XXII

## BIHAR

### I. THE PROVINCE

In 1937 two new major or Governor's provinces were formed—the Provinces of Bihar and Orissa—out of what had been the one combined Province of Bihar and Orissa.

The old Province of Bihar and Orissa itself had only been in existence since 1912, and was partly carved out of Bengal. The Province of Bihar falls very easily into two natural regions. These are: (1) The Middle Ganges Valley corresponding roughly with Bihar, (2) The Chota Nagpur Plateau corresponding with Chota Nagpur. *Patna* on the Ganges is the provincial capital.

### II. THE MIDDLE GANGES VALLEY[1]

**1. General Characters.**—In the last chapter we learnt of the dry regions of the Upper Ganges Valley, where the rainfall is less than 40 inches in a year and where irrigation is necessary for the proper growth of most crops. Everywhere in that region wheat and barley together, and usually wheat alone, are more important than rice. In the next chapter on the Deltas Region or the Lower Ganges Valley, we shall

[1] This natural region comprises nearly the whole of Bihar north of the Ganges and the United Provinces east of Allahabad and north of the river, except a narrow strip in the north belonging to the Terai (Sub-Himalayan Region). A strip of Bihar, south of the Ganges and forming parts of the districts of Shahabad, Patna, Gaya, etc., also belongs to this region.

learn of a region where the rainfall is everywhere more than 60 or 70 inches, where much of the land is flooded every year and where rice occupies three-quarters of the total area of crops. In the Deltas region too, practically no wheat nor barley is grown and no millet; the climate is too wet. The region which we are now going to study in detail and which we have called the Middle Ganges Valley lies between

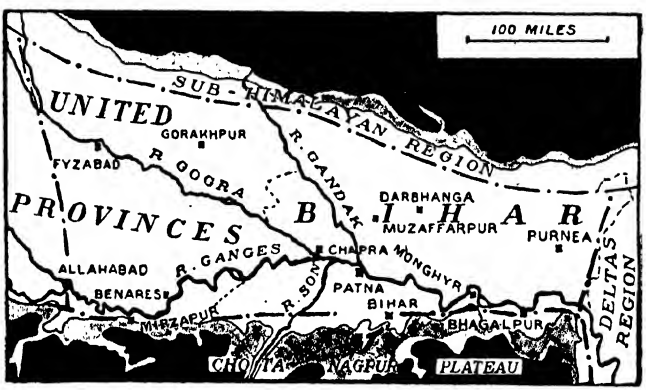



**Fig. 136. The Middle Ganges Valley**

All land over 500 feet dotted; all land over 1,000 feet black. Notice from your atlas the numerous railways in this natural region.

the Dry Region of the Upper Ganges and the very wet region of the Deltas. We find that its characters are between the two, and its crops are a mixture of those most important in the drier regions and those found in the Deltas Region.

2. **Climate.**—There is no sharp line which forms the boundary of the Upper Ganges Valley or Dry Region. At its western end the Middle Ganges Valley passes gradually into the Dry Region, and we can take

Allahabad, or the 40-inch rainfall line, as very roughly the division between the two. As we travel from Allahabad down the River Ganges eastwards, we find the climate gradually becomes damper, the crops gradually change from those of the dry region to those of the wetter. Thus the part of the Middle Ganges Valley which lies in the United Provinces is drier than the part in Bihar. Although there is a gradual change from one end to the other, the Middle Ganges Valley has certain characters of its own. Except for the Son River canals, there are no great canals for irrigation.

**Fig. 137. Proportion of cultivated land in the Middle Ganges Valley**

1, fallow; 2, sown.

The rainfall is sufficient and crops can be grown without water brought from wetter regions. We find that in the dry season, when the surface soil gets dry, water from wells is used to help the crops, but this 'irrigation from wells' is different from the great system of canals found in the Upper Ganges Valley.

The Punjab Plains and Upper Ganges Valley being a long way from the sea are very hot in the hot season, but cold in the cold season. The Middle Ganges Valley is nearer the sea and does not suffer from such great heat in the hot season. Its rainfall varies from rather less than 40 inches at Allahabad

to more than 70 inches in the northern part of the Purnea District. When, however, we compare the climate of this region with that of the Deltas Region, we find the rainfall is less and the air is much drier. In the Middle Ganges Valley, the cold season which lasts for four months (November to February) is colder than in the Deltas Region and in European houses fires are used. The average temperature for Bihar in December or January is only 61° compared with about 66° at Calcutta in the Deltas Region. The Hot Weather, lasting from March to June, is hotter than in the Deltas Region and the air drier. Hot scorching winds blow down the Ganges Valley from the still hotter regions of the Punjab.

The part of this natural region lying south of the River Ganges is somewhat drier and here we find irrigation canals, deriving their water from the Son River.

3. **Rivers.**—Like the Upper Ganges Valley and the Deltas, this is a flat region without any hills and again part of the great plain or northern India. It stretches from the Sub-Himalayan on the north to the slopes of the Chota Nagpur Plateau on the south. Near its south boundary is the middle course of the great Ganges River, but the northern three-quarters of the region is watered by numerous streams flowing down from the Himalaya Mountains. All the streams bring down quantities of mud and silt and have built up for themselves banks which are higher than the surrounding land. Often during the rainy season they overflow and flood the land on either side. The rivers, too, frequently change their courses and there are numerous shallow lakes or marshes scattered over the Middle Ganges Valley which represent old, deserted courses of such rivers, or low-lying areas between the rivers. But look at Fig. 137 and notice what a large proportion

of this region is cultivated—three-quarters of the whole. So we find the marshes are drained and as far as possible used for cultivation. Notice from Fig. 137 that there are no original forests left. In the narrow

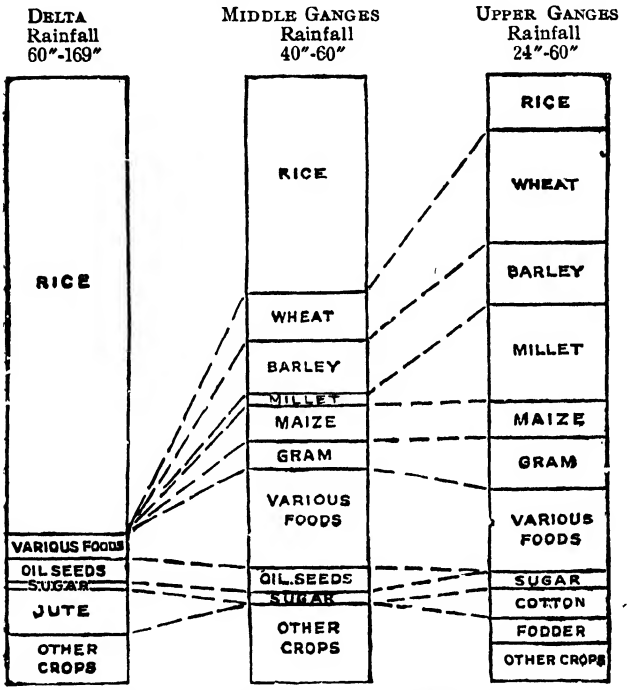



**Fig. 138. The crops of the Ganges Valley**

The three main natural regions compared.

strip south of the River Ganges, the land is drier and marshes are rare.

**4. Crops.**—Now let us look at the crops grown in this region (Fig. 138, middle column). Rice has now

become the most important. Wheat and barley are also grown but in smaller quantity. But millet, which is the staple grain in many of the drier parts of India, has now almost disappeared and only a very little is grown. Cotton, too, is of very little importance in this region, but we find a considerable area is sown with oilseeds (linseed, rape or mustard and sesamum) which are not important in the Upper Ganges Valley.

This natural region used to be the principal indigo region of India. Indigo was grown for the preparation of a dye, but now chemical dyes are made in factories and the indigo industry is no longer important.

5. **People.**—The inhabitants of the greater part of this natural region, that is, of Bihar, are the Biharis. 'On the whole, they are men of slow thoughts but long memories, vigorous and disciplined.' They are somewhat different from the quicker but less vigorous Bengalis of the Deltas Region. They live in a healthier region and so are physically stronger. Like the Bengalis, the Biharis live in small houses in the midst of their lands and not in villages like the people of the Upper Ganges Valley. Three out of every four persons are engaged in agriculture and only one in every ten in industry. The population working the land is so dense that every year large numbers are compelled to leave their own country and go to other parts of India to work. Many of them go every year in the cold season to work in the mills of Bengal or the docks of Calcutta, returning to their own homes for four or five months, in time to cultivate their land.

There are few large towns in this natural region. Just as in the Upper Ganges Valley, there are famous old towns like Monghyr, and more modernized towns which are developing industries, like Patna. The

large town of the natural region, Benares, was mentioned in the last chapter as it lies in the United Provinces.

*Patna* is the headquarters of the Province of Bihar. Besides being the centre of Government of the Province, it is an important collecting centre for agricultural produce. Patna has given its name to 'Patna Rice', a very fine kind of rice. The town stretches for a long distance along the banks of the Ganges. It is south of the river and so connected directly with Calcutta by the East Indian Railway (see Chapter XXXVI).

*Bhagalpur* is another large town on the south bank of the river towards the eastern end of the natural region.

*Monghyr* is a famous old town also on the southern shores of the River Ganges, between Patna and Bhagalpur.

*Darbhanga* is a large and important town in the centre of the rich plains of Northern Bihar and serves as a collecting and distributing centre.

*Muzaffarpur* is further west in the same region, and is less important. It is the centre of the now dying indigo industry.

*Chapra* is situated at the junction of the Gogra and Ganges Rivers and used to be a very important river-port with numerous factories, but it is now getting smaller.

*Bihar* is a small town some distance south of the River Ganges and on the borders of the middle Ganges Valley and the Chota Nagpur Plateau.

## III. THE CHOTA NAGPUR PLATEAU

The Chota Nagpur Plateau forms the north-eastern part of the great Plateau of Peninsular India. It

consists of forest-covered country inhabited largely by backward tribes. The plateau parts themselves have only about sixty people to the square mile.

The forests are the most important part of the Chota Nagpur Plateau. The rainfall is good; everywhere the plateau receives more than 40 inches of rain and so we find splendid forests of the valuable sal tree and other trees whose wood makes good timber. On the flatter parts of the plateau we may find open grassy downland or areas of scrubland.

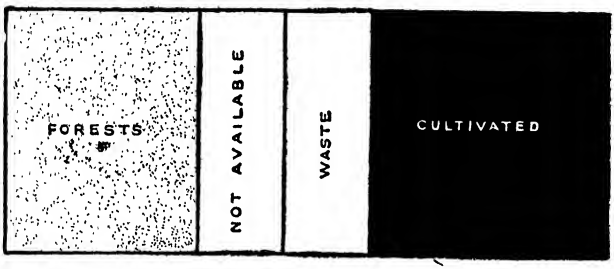



**Fig. 139. Proportion of cultivated land in the Chota Nagpur Plateau**

(Not including the northern slopes with sandy soil in Gaya and Mirzapur, where are found few forests, but much waste land.)

Many of the river valleys are rocky, but where they are broader, paddy can be grown. The paddy fields are not like the flat ones which we see in the plains, but they are narrow ones built down the valley sides like a series of big steps. The soil in the valleys is often good, because the rain washes down the fine particles from the hill-sides into the valley, but on the ridges the soil is often poor. On the hill-sides or ridges where the soil is good enough, maize, millet, oil-seeds and pulses can be grown. Only a small proportion of the land is cultivated. Much of it is

'waste' and a large part is covered with forests. In the north of the region, on the slopes towards the Ganges Valley, there are large areas of dry sandy soil as in Mirzapur. An important industry in the forest parts is the collection of lac. Lac is a sticky or resinous substance deposited on small branches of trees by a tiny insect called the lac insect. The substance is collected and purified and is used for many purposes, such as in the manufacture of paint and varnish, sealing-wax and gramophone records.

The Chota Nagpur Plateau includes some of the wildest and least known parts of India which are inhabited by very primitive tribes. Many of these forest tribes still use bows and arrows, and some of them live mainly on the wild animals, chiefly monkeys, they catch or on wild fruits gathered from the trees. The only clothing some of them wear consists of a few leaves.

The Chota Nagpur Plateau gives us a fine example of how the people living in one natural region may be quite cut off from those living in another. This is often so with people living in hilly regions or forests where it is difficult to travel about. In the plains the people can travel about easily and so exchange ideas with one another and thus become civilized. But in the hills it is difficult to travel about and the people keep all their old customs. Throughout history successive races have invaded India and settled in the fertile plains and have driven the original inhabitants away into the hills. The natives of the Chota Nagpur Plateau were in past ages driven into the hills and there they have remained. They are small people only about five feet high, honest and brave. They would look upon us who live in the plains as 'foreigners'. There are many different tribes; the

Santhals are the most numerous. Many of the tribes speak old languages of their own, quite different from any of ours. It is found that out of every 100 people, only three travel on a railway in a year; so you see they are still very backward.

Gaya, on the northern margin of the plateau, is a place of pilgrimage for it was here that Buddha, the founder of the Buddhist religion, received his enlightenment.

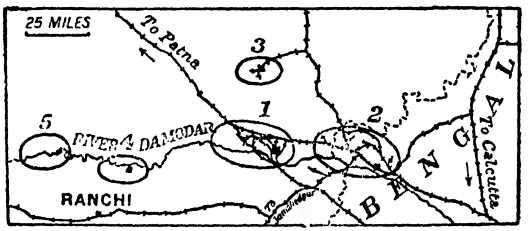
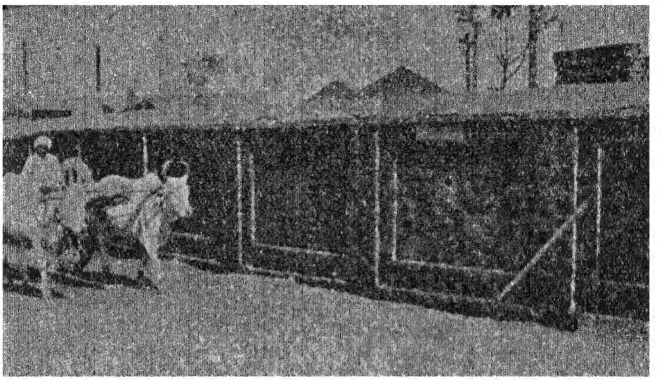



**Fig. 140. The Coal-fields**

1, Jherria Field; 2, Ranigunj Field; 3, Giridih Field; 4, Bokaro-Ramgarh Field; 5, Karanpura Field.
Notice the network of railways in the two most important fields (1 and 2).

You have learnt in Chapter III that most of the valuable minerals are found in areas of old, hard crystalline rocks, like those which form the Chota Nagpur Plateau. In the north are many mica mines. Mica is a mineral rather like glass, you can see through it, but it can be bent and can also be made very, very hot without melting. So it is used for making little windows in furnaces where glass would be melted, and for other purposes, such as the manufacture of electrical apparatus. In the districts of Singhbum and Mayurbhanj are found valuable deposits of iron ore as well as copper and manganese.



[*Photo : L. D. Stamp*

**Fig. 141. The Commonest fuel in India**

Cakes of cow dung stuck on a wall to dry in the sun. This cow dung ought to be used as manure on the fields to make them fertile; it is very wasteful to use it as fuel to burn.

Limestone is also quarried in several places. A large part of the Chota Nagpur Plateau is in the Provinces of Bihar and Orissa. On the edges of the plateau, chiefly in the valley of the Damodar River, are some valuable coal-fields—a small one at Daltonganj, but very important ones around Jherria, Ranigunj, and Asansol on the eastern slopes of the plateau. Nearly $\frac{9}{10}$ of all the coal produced in India comes from that region. Fig. 140 shows the position of the coal-fields. A large iron and steel industry has grown up in this district within recent years, using the local supplies of coal, iron ore, manganese and limestone. The Tata Iron and Steel Company, at Jamshedpur and Tatanagar (near the Singhbum iron-field), makes over two-thirds of all India's iron and steel, and there are other smelting works on the coal-fields at Asansol, Kulti and Jherria.

On the Chota Nagpur Plateau is *Ranchi* the summer capital of the Province.

# CHAPTER XXIII

## BENGAL

### I. THE PROVINCE

*The boundaries of the Presidency of Bengal have frequently been changed.* Its boundaries were determined in 1912. It consists almost entirely of a vast alluvial plain, crowded with people. There are so many people that it is one of the most thickly populated regions in the world, with nearly 600 people to the square mile. It is now divided into East Bengal, forming part of the Dominion of Pakistan, and West Bengal, forming part of the Indian Union.

Nearly the whole of Bengal belongs to one natural region—the Lower Ganges Valley or the Deltas Region, consisting of the deltas of those mighty rivers, the Ganges and Brahmaputra. In the north a small strip of Terai country (known in Bengal as the Duars) belongs to the Sub-Himalayan Region, whilst the District of Darjeeling lies in the Himalayan Region. In the east the Lushai Hills and the small State of Hill Tippera belong to the Eastern Hills Region; in the west the region near the coal-fields may be considered as belonging to the slopes of the Chota Nagpur Plateau. But by far the greater part of Bengal belongs to the Deltas Region.

### II. THE DELTAS REGION[1]

**1. General Features.**—The great Ganges Plain is divided into three parts by its climate. We have

[1] Comprising the whole of Bengal except Darjeeling, Jalpaiguri, Chittagong Hill Tracts and part of Chittagong, as well as the Sylhet District or Surma Valley.

studied the Upper Ganges Valley or Dry Region and the Middle Ganges Valley and there remains now only the Lower Ganges Valley or the Delta. It comprises nearly the whole of the Province of Bengal and includes

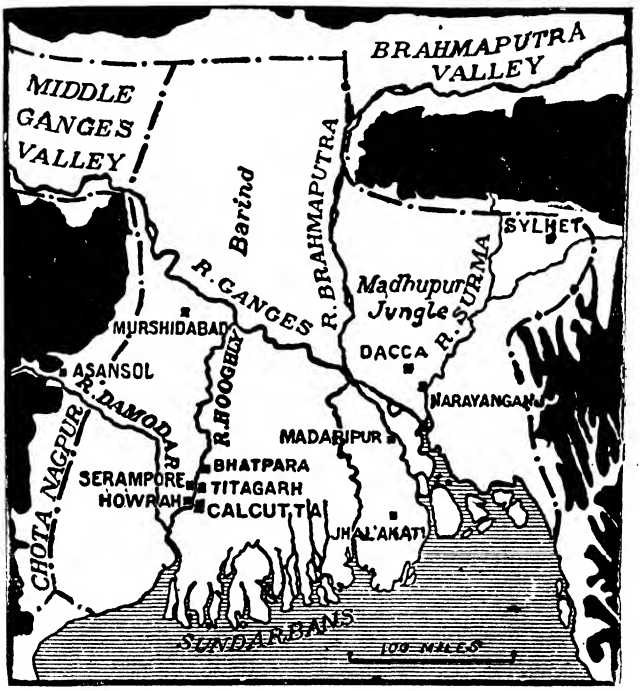



**Fig. 142. The Deltas Region**

All land over 1,000 feet black.

the Lower part of the Valleys of the Ganges and the Brahmaputra as well as the Surma Valley Region. Nearly the whole of this region is a fertile

alluvial plain—watered by the Ganges and Brahmaputra with their numerous tributaries and distributaries. For thousands of square miles there is not a hill or even a rock; the soil is everywhere a fine silt or 'alluvium' and not a stone is to be found. The region is practically flat; the rise from the sea towards the north is so very gradual that it cannot be seen. The heavy rainfall makes this region very different from the Upper and Middle Ganges Valleys; instead of being dry and brown in the Hot Season the country is always green.

To enable us to study it more carefully, we may divide the region into three parts:—

(*a*) The Ganges-Brahmaputra Doab, sloping gradually from the Sub-Himalayan Region in the north towards the Ganges.

(*b*) The Old Delta or Central and Western Bengal.—Owing to several causes the great Delta of the Ganges and Brahmaputra has moved gradually from the west to east. Central Bengal is a land of 'dead and dying rivers'. Formerly the river channels carried water from the Ganges to the sea, but now very little water passes through them. The place of river channels is now often taken by large swamps or 'bhils', many of which have been re-drained and form valuable rice land.

(*c*) The New Delta and the Surma Valley.—Here the great rivers are still actively building up their deltas and every year huge quantities of silt are brought down by the Ganges and the Brahmaputra. In the high water season a great part of the area is flooded and a rich deposit of silt spread over the country.

2. **Climate.**—In Figs. 20 and 21 of Chapter IV we learned that the temperature of this part of

North-Eastern India is warmer than that of the drier regions of the Upper Ganges Valley in the cold weather but it is much cooler in the hot weather. It has, as we say, a 'more equable climate'.

The rainfall of the Deltas Region is everywhere good and we notice that the rainfall increases gradually as we leave the borders of the Chota Nagpur Plateau or the Middle Ganges Valley and go eastwards towards the rainy Eastern Hills Region. Malda on the western borders has 53, Calcutta 60, Dacca 73 and Sylhet 160 inches. Everywhere the rainfall is sufficient for the growth of a rich and luxuriant vegetation and for the cultivation of paddy. Nearly everywhere one sees rice swamps, with here and there a collection of huts with its clumps of bamboos, palms and plantains. Now we will look at the three parts into which we have divided the Deltas Region.

3. **The Ganges-Brahmaputra Doab or North Bengal.**—This area stretches from the Terai country or the Sub-Himalayan Region on the north as far as the Ganges River on the south. To the north-east is the narrow Brahmaputra Valley, to the west is the Ganges Valley. It is watered by streams flowing down from the Himalaya Mountains. They are torrents in the wet season, and frequently change their courses (as the Tista has done) but in the dry season are almost dry. Much paddy is grown, as well as jute. The Barind, a stretch of ground slightly above the general level, used to be covered with forest; now it has brushwood jungle with a few trees.

4. **The Old Delta.**—This is a typical delta, but it has been raised by the deposits of silt so that it is no longer covered with flood water in the wet season. The waters of the Ganges no longer pass through the numerous channels, they no longer deposit

their load of fertile silt. Instead we find broad swamps called bhils. These bhils are in many places drained and form fertile paddy land. The most typical part of the delta is between the Hooghly River and the Madhumatti River. In the south are the Sundarbans or forest swamps, but the land is gradually being reclaimed and used for growing paddy. Further west is the delta of the numerous streams which flow down from the Chota Nagpur Plateau—of which the Damodar is the most important—and then the land gradually rises towards the plateau; the soil becomes hard and poor and covered with scrub jungle. But in this extreme western part are found the great coalfields and ironfields of Western Bengal—Raniganj, Asansol and Jherria, described in Chapter XXII.

5. **The New Delta and the Surma Valley.**—Here we have a typical Delta, covered by a network of rivers, streams and creeks. Every year the land is flooded and fertilized by the silt brought down by the Ganges and the Brahmaputra. Boats take the place of carts, there are few roads and few railways. In the rains only the river banks and the artificial mounds covered with houses appear above the water. It is impossible to go from one village to the next, or sometimes from one house to another without a boat or a raft or something which will float. Yet it is a fertile region, producing enormous quantities of rice and jute and inhabited by a dense population. In one place, called the Madhupur Jungle, a slightly higher ridge has prevented the great rivers moving still further eastwards. This ridge is covered with grass or forest jungles.

6. **Crops.**—Let us now look at the crops of the Deltas Region. Notice first Fig. 143. The 'Forests' which comprise six per cent of the whole area are the

Sundarbans—found in the districts of Backergunge, 24-Parganas and Khulna. You will notice that there is

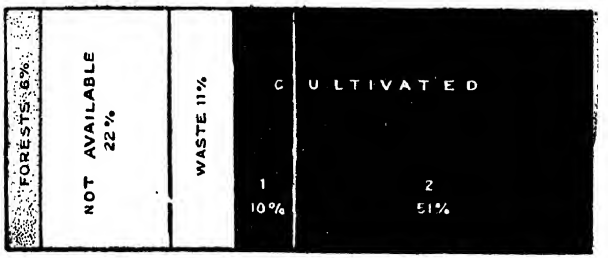
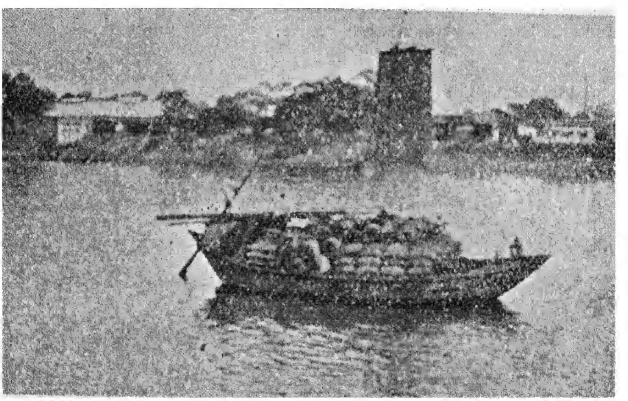



**Fig. 143. Proportion of cultivated land in the Lower Ganges Valley and Delta**

1, fallow; 2, sown.

more waste land and land, not available, than in the Middle Ganges Valley or Upper Ganges Valley. This



[*Photo*: *L. D. Stamp*

**Fig. 144. Much of the transport in the Deltas Region is by boat**

This picture shows a laden boat coming down the River Hooghly (or Hugli).

is because of the large area still occupied by swamps, as well as the waste land of the Barind, Madhupur Jungle and Western Bengal. Still, well over half the whole of the Deltas Region is cultivated. Compare this with the hilly regions. Now study again Fig. 138. Rice is by far the most important crop—it occupies practically three-quarters of the whole cultivated area. As we travelled down the Ganges Valley from the dry western region towards the Delta, we noticed the wet zone crop, rice, becoming more and more important and the dry zone crops—wheat, barley, millet, maize and gram—becoming less and less important. In the Deltas Region the area occupied by wheat, barley, millet and maize is so small that it cannot be shown on the diagram. A very important new crop appears —jute. Jute is grown for the sake of its strong fibre. Nearly all the sacks and gunny bags in the whole world are made from jute grown in the Deltas Region. Another important crop is oil-seeds—linseed, sesamum and rape.

7. **People.**—A natural region must have roughly the same physical features and roughly the same climate throughout. Usually this results in the same vegetation and products being found through the region and often too, the same people. The Deltas Region is an excellent example. Everywhere it is flat, everywhere the climate is damp. Rice is the principal crop. Throughout this region too, the inhabitants are nearly all Bengalis and ninety-five out of every 100 people living in the Deltas Region speak Bengali as their native language. The Bengalis are divided into two well-marked groups by their religion, a little less than half are Hindus and about half are Muslims. Three-quarters of the people are cultivators and engaged mainly in the production of rice or jute,

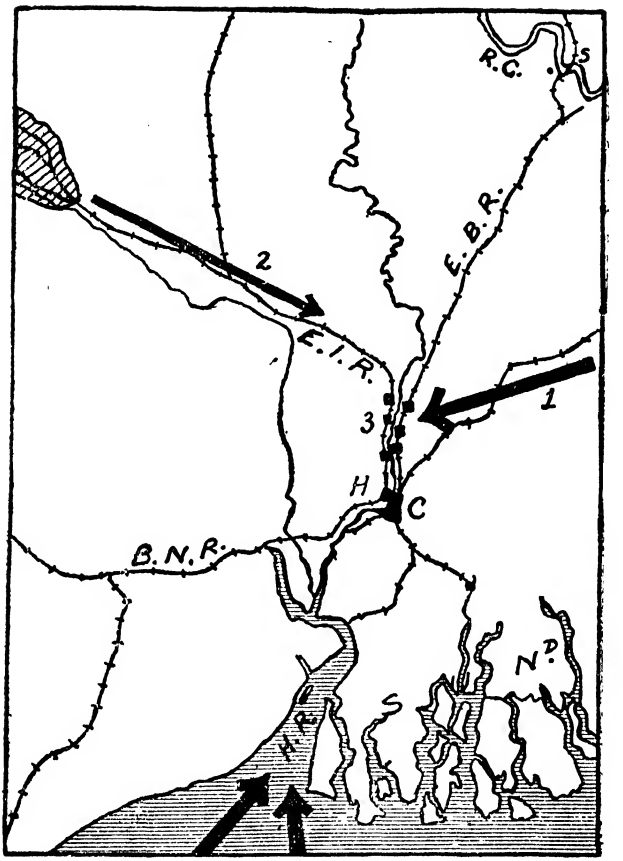
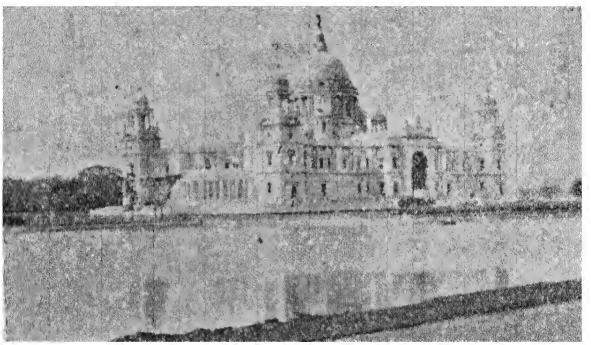



**Fig. 145. The position of Calcutta**

Compare with Fig. 147.) 1, supply of jute and rice; 2, supply of coal from the coal-fields (the shaded area is the Ranigunj coal-field); S, the jute mill towns along the river Hooghly; R. G., River Ganges with a bridge near Sara (S); H, Howrah; C, Calcutta; H.R., Hooghly River.

about eight people in a hundred are engaged in industry and five in trade. Naturally the people who are engaged in agriculture want to live near their fields and so we find that ninety-three people out of every 100 live in villages or isolated huts and only seven people in every 100 live in towns. We learnt that in the Dry Region of the Upper Ganges Valley the people live in villages consisting of a collection of houses.



[*Photo : L. D. Stamp*

**Fig. 146. The Victoria Memorial, Calcutta**

One of the beautiful buildings of Calcutta, built of marble and used as a museum.

In the Deltas Region it is quite different. There are really no villages. Each cultivator builds a house or a hut in the midst of his fields; in very wet parts as in the New Delta he must first build a mound on which to place his hut and prevent it from being flooded. Thus the houses or huts are scattered all over the country and most cultivators work their own piece of land.

8. **Towns.**—Since only seven people out of every 100 live in towns, in the whole of the Deltas Region

there are only seven towns with a population of more than 50,000. There are really two classes of towns.

(*a*) The famous old towns of the past, or those which merely act as 'market towns' for the districts: they are old and small and sometimes are getting smaller. Murshidabad with 10,000 people is an example.

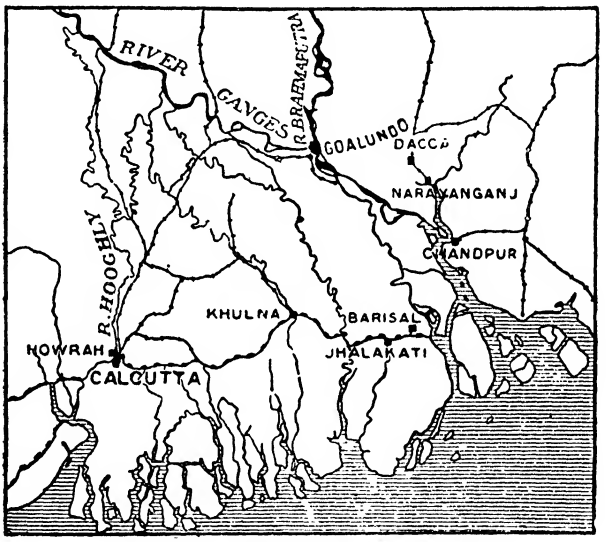



**Fig. 147. Waterways of the Delta**

Notice the connection between Calcutta and Barisal by the Calcutta and Eastern Canal, between the Hooghly and the Ganges by a series of channels. Notice how the waterways link up the railways.

(*b*) The industrial and commercial towns, which have grown up within recent years around rice or jute mills. All the largest towns belong to this class.

*Calcutta,* the chief town of West Bengal, is the largest city in India and the second largest city in the British Empire. It is only one-fifth the size of London.

but still comes next in size. It has nearly 1,500,000 people. It was the capital of India until 1912 when the Government moved to Delhi, but Calcutta still forms the 'commercial capital' of India. Although over seventy miles from the sea, great ocean steamers can reach its wharves by the River Hooghly. The River Hooghly is a dangerous river because of the 'bore' or tidal wave which rushes up it as a wall of water at high tide. But this bore helps to keep the waterway clear. Notice very carefully from Figs. 142 and 145 how well Calcutta is situated to receive and export the products of the fertile Ganges Valley behind it. A big port can only grow up when there is a rich and fertile district behind it which can produce goods for export and which has a great population requiring other goods. The district or region behind a port, and for which the port serves as a gate to the outside world is called the 'hinterland' of the port. The hinterland of Calcutta includes the great part of the great Ganges Valley. On the opposite side of the River Hooghly and really forming part of Calcutta is Howrah with nearly 200,000 people. It is from Howrah that the railways start which cross India to Bombay, or go to Madras and Southern India, or up the Ganges Valley. A hundred years ago the site of Calcutta was an unhealthy swamp; it has been made into the largest and one of the healthiest cities of India by the labour of man, and the activities of Government.

*Dacca,* the chief town of East Bengal, is the second largest city in the Deltas Region (counting Howrah and Calcutta together) and has now over 100,000 inhabitants. It is the centre for the rich agricultural regions of East Bengal or the New Delta. Dacca, unlike Calcutta, was an important city 300 years ago and an old capital of Bengal.

Outside Calcutta and Dacca there are really no big cities or towns. Amongst the largest of the jute mill or rice mill towns which are mainly situated along the River Hooghly are *Bhatpara, Titagarh* and *Serampore,* all on the River Hooghly. Besides the towns in which manufacture is carried on, there are others which act as collecting stations. *Narayanganj* and *Goalundo* (river ports) and *Madaripur* are examples. To these and to similar places the cultivators of the Delta bring their jute and rice. It is collected and sent to the mills in larger boats.

*Jhalakati* is one of the important centres of Eastern Bengal and the centre of the betel-nut trade. *Sylhet,* the centre of the fertile Surma Valley, has only 17,000 people.

In the Western mining region you should notice *Asansol* and *Ranigunj,* growing centres of the coal trade and railway junctions. These two towns lie outside the Delta proper. (See Chapter XXII.)

### QUESTIONS AND EXERCISES

1. Compare the positions of Calcutta and Dacca. Do you think Dacca will ever become as important as Calcutta? Give reasons.
2. What is meant by 'hinterland'? Which has the more important hinterland, Calcutta or Chittagong, and why?
3. In what ways do Central Bengal (Old Delta) and East Bengal (New Delta) differ from each other.
4. Explain why Calcutta has become the most important port of India, although it was once a swamp.
5. Compare the products of the Deltas Region with those of the Upper Ganges Valley. Why do they differ?
6. Describe the climate of Calcutta or Dacca.
7. What is jute? Where is it grown and what are its uses?

# CHAPTER XXIV

## SIND

1. **General Features.**—Since April 1, 1937, Sind has been a separate province. It now forms part of the Dominion of Pakistan. Formerly it formed part of the great Presidency of Bombay. Sind is really the lower part of the Indus Valley and part of the great Plain of Northern India.

Sind has often been called the 'Unhappy Valley'. But when compared with some of the natural regions we study in this book, such as Baluchistan and the Thar Desert, it is a fortunate land. In the days of old, when India was invaded by the Greeks and the Arabs, the invaders had marched for long weary days and weeks through the desert wastes of Persia and Baluchistan and they thought the Valley of the Indus a most promising country.

Sind consists of a broad dry alluvial plain stretching from the edge of the Baluchistan Plateau (the Khirthar Hills) on the west to the Thar Desert on the east. Running through the centre of the valley is its life and soul—the Indus River. Just as Egypt is the 'Gift of the Nile' so is Sind the 'Gift of the Indus'. In Chapter XIX we learnt something of the Indus River in the Punjab Plains. Soon after it leaves the Punjab the river flows through a narrow rocky gorge. This gorge is important for several reasons. It separates the Punjab Plains from the Plains of Sind. The mighty river has here been crossed by a railway bridge (Rohri). It is here, just below the town of Sukkur, that the rocky bed of the river affords a good

foundation for one of the largest irrigation dams in the world.

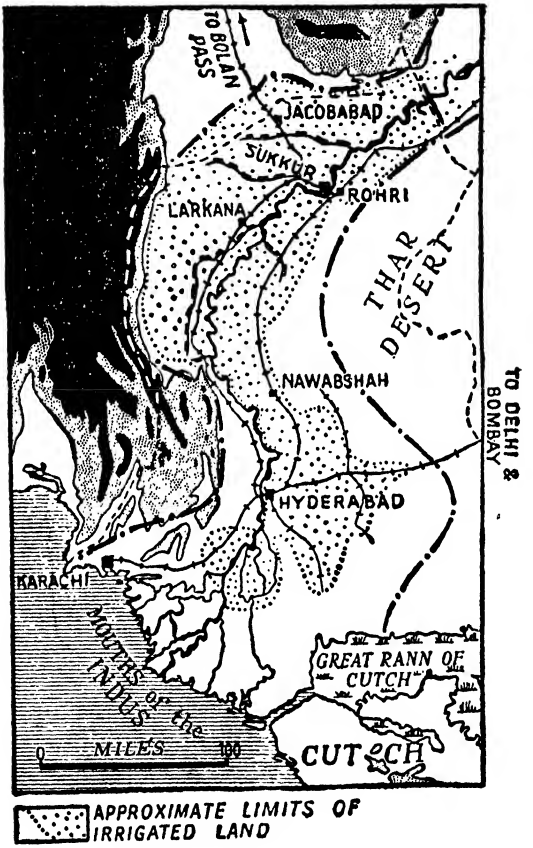



**Fig. 148. The Lower Indus Valley**

Sind is a very dry region. Look back at Fig. 41 and you will notice that part of it gets less than

5 inches of rain in the year. A little more falls near the coast, but it is still very, very dry. Sind would be quite a desert, if it were not for the River Indus from which water can be obtained to nourish the crops. The Indus is fed by the melting of the snows in the Himalaya Mountains far away and is not affected by the small rainfall in the lower part of its valley. Although Sind is *inside* the Mountain Wall of India, it is very little affected by the South-West Monsoon. The Delta of the Indus is not very far from the dry lands of Arabia and North-East Africa and the South-West Monsoon has not blown very far over the sea. It has not had time to gather very much moisture and even when it reaches Sind there are no mountains to cause it to rise and give up its moisture. Instead, it blows towards the still hotter and thirstier plains of the Punjab.

2. **Irrigation.**—The rainfall in Sind is too small for crops to be grown without irrigation. For ages past irrigation has been practised in Sind, but it was different from that of either the Punjab or Baluchistan. The irrigation in Sind was by means of 'inundation canals'. Canals were dug from the banks of the River Indus through the flat alluvial plain. They were filled with water when the river was in flood but later in the year they became dry. These canals did not, then, have water in them all the year round like the larger canals of the Punjab. Study Fig. 148 and notice the area which was irrigated by the flood canals from the Indus.

Away from the irrigated land, Sind is a lonely, barren desert. Here and there are the remains of canals no longer used, the remains of cities which no longer exist. There are deep dry valleys which were once occupied by branches of the Indus. Probably the

main stream of the Indus once flowed much further to the east than it does now, and emptied itself into the Great Rann of Cutch. The old course is marked by a broad valley, but quite dry. The Rann of Cutch is an interesting region. Look at its position on Fig. 148. It was once an inland sea, but it was gradually

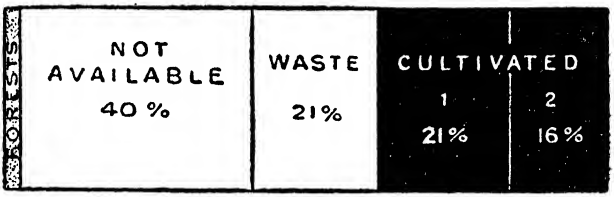



**Fig. 149. Cultivated land, Lower Indus Valley**

filled up by mud and sand (alluvium) brought down by the rivers. It is no longer an arm of the sea but merely a marshy area, almost dry in the hot season.

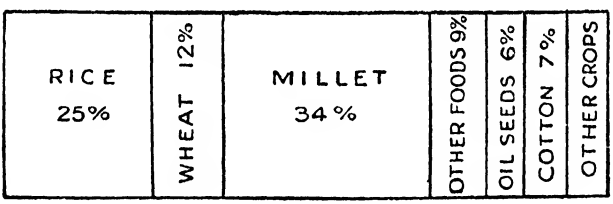



**Fig. 150. Crops of the Lower Indus Valley**

It is still being filled up by sand blown from the Thar desert and soon it will be dry, barren desert.

Look again at Fig. 148 and notice that the Delta of the Indus is not marked as irrigated. Other rivers in India have deltas—like the Ganges and the Irrawaddy—and their deltas are rich rice-growing regions thickly populated. There is excellent pasture in parts

of it, but much of the Delta of the Indus is a useless waste region, almost uninhabited.

Near the coast it is flooded by the waters of the river and sea in the hot season, and in the cold season is a waste inhabited only by wild birds. Further inland is a strip of desert where once flourished cities and ports.

3. **The Sukkur Scheme.**—A very great change has taken place in Sind. For many years past a great scheme has been carried out to replace the poor 'inundation canals' of Sind by a great system of permanent canals with water in them all the year. This scheme, known as the Sukkur or Lloyd Barrage Scheme, is one

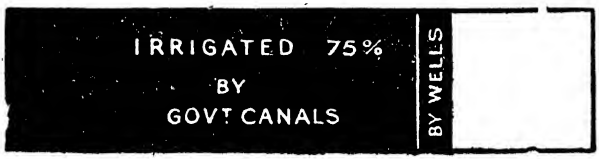



**Fig. 151. Proportion of irrigated land, Lower Indus Valley**

of the largest works for irrigation ever attempted. A great dam or weir, begun in 1923, completed in 1932, has been built across the River Indus below the town of Sukkur and the water of the Indus can now be stored up to fill a great series of canals, stretching right along the Lower Indus Valley. The enormous area of 5½ million acres is being irrigated with water from the Indus. Study Fig. 152 carefully and notice where the canals have been made or are being made.

4. **Crops.**—Now let us look at the agriculture of Sind. Fig. 149 shows the proportion of land which is cultivated and Fig. 150 shows the crops which are grown. Wheat, millet and cotton are the most important. Fig. 151 shows the proportion of irrigated

land in the Lower Indus Valley. There is so little rain that scarcely any 'dry' crops can be grown.

5 **Towns.**—In the days of old the ports of Sind

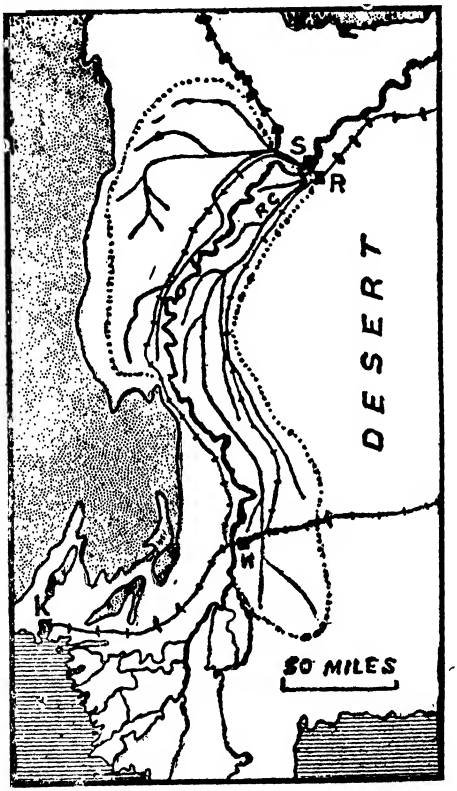



**Fig. 152. The Sukkur Irrigation Project**

were small towns in the delta, but they are now entirely replaced by the great port of Karachi which is also the capital of the Dominion of Pakistan. Karachi

is situated to the west of the delta and on the extreme west of the natural region. This position west of the delta avoids the silt brought down by the river Indus, which is swept eastwards by a sea current.

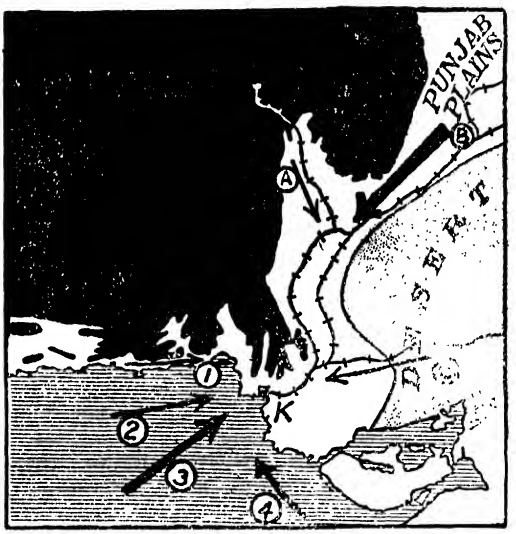



**Fig. 153. The position of Karachi**

Land over 1,000 feet, black; desert, dotted. Routes from overseas: 1, air route along the Mekran coast; 2, sea route from the Persian Gulf; 3, sea route from Aden and Europe direct; 4, sea route from Bombay. Land approaches: A, from Quetta and Baluchistan through the Bolan Pass; B, by rail from the Punjab Plains; C, from Delhi across the Thar Desert by railway.

Karachi is the natural outlet for the whole of the Punjab as well as Sind and is rapidly growing in importance, especially since it became the first air port in India for air liners flying from Britain. From Karachi the railway runs to a point, at the head of the Indus Delta, where the Indus can be bridged. On

the east of the river is the important town of Hyderabad (Sind). From here there are two railways. One strikes eastwards right across the desert into Rajputana and on to Delhi. The other follows up the valley to Rohri and on to the Punjab. At Rohri there is another bridge across the Indus Gorge to Sukkur. Notice also that another line from Karachi follows up the western side of the river and connects with Quetta and Baluchistan, through the Bolan Pass.

Karachi is the great wheat port of India exporting, in those years when there is a surplus, the wheat of the Punjab. A great amount of cotton is also exported. As we have seen, most of the cotton grown in India is of the short-stapled variety, used in the Bombay mills or exported to Japan. But in the Punjab longer stapled American varieties are grown, and this cotton is exported to Britain and Europe.

## QUESTIONS AND EXERCISES

1. Write a short account of the different kinds of irrigation in India.
2. Describe the climate of Sind
3. Compare and contrast the Lower Indus Valley with Baluchistan.
4. Do you think Sind will increase in importance? Give your reasons.
5. Draw a sketch-map showing the importance of the position of Sukkur.

# CHAPTER XXV

## BOMBAY PRESIDENCY

**General.**—For nearly a hundred years Sind formed part of the Bombay Presidency. Its separation has left Bombay the smallest of the three Presidencies of Madras, Bengal and Bombay, since the former Bombay States (now the States of Western India, in Cutch, Kathiawar and Gujarat) now come directly in relationship with the Central Government of India.

Bombay Presidency is divided for purposes of government into three commissionerships—the northern or Gujarat, the central or Deccan, and the southern or Carnatic.

These do not quite correspond with the three great geographical divisions which are:—

(*a*) *Gujarat,* comprising the country north of Bombay City and lying between the edge of the plateau and the sea. With this area may be considered the large peninsula of Kathiawar and Cutch—the lands occupied by the States of Western India.

(*b*) *The West Coast Region,* the very wet region south of Bombay lying between the crest of the Ghats and the sea (the Konkan Coast).

(*c*) *The Deccan Lavas Region,* stretching inland from the crest of the Western Ghats over the plateau. Most of this area is covered with the Deccan Lavas giving a black cotton soil. Some districts in the south (Dharwar and parts of North Kanara) lie on the ancient rocks of the plateau.

We will now study each of these regions in order.

# CHAPTER XXVI

## CUTCH, KATHIAWAR, GUJARAT AND BARODA[1]

1. **General Features.**—There are some regions which vary so much from place to place that they ought

**Fig. 154. The Gujarat Region**

Land over 500 feet, dotted; land over 2,000 feet, black.

[1] Comprising the States of Western India in Cutch and Kathiawar, the Gujarat Division of the Bombay Presidency, the whole of the State of Baroda and adjoining Indian States of the Bombay Presidency.

really to be divided up into a large number of very small regions. On the whole this region, Gujarat, is a lowland region, less than 1,000 feet above sea-level, but has numerous small hills. It lies between the highlands of the Rajput Upland Region and the sea and is really a coastal region. The great Peninsula of Kathiawar makes it much broader than the other coastal regions.

At the southern end Gujarat joins the very wet West Coast Region. At the southern end Gujarat is, therefore, a wet region, but it quickly gets drier as one goes northwards. At the northern end it joins the Thar Desert and so is very dry indeed.

It will be simplest to divide the region up into five parts—South, Central and Northern Gujarat, Kathiawar and Cutch—and briefly describe each.

2. **South Gujarat** is the wettest part of the region and joins the West Coast Region. Along the coast the climate is equable and healthy. There is a narrow strip where the soil is salt and poor and the water brackish; behind this is a broad strip of rich black soil very suitable for rice and the best kind of cotton, sugar-cane and many other crops. The land is thickly populated, the people rich and flourishing. Farther inland hills appear, covered with forest. Forest and thick jungle cover large areas. In these inland parts the soil is poorer, cotton and poor rice are the most important crops. The eastern parts of South Gujarat are still wilder, more than half is covered with dense unhealthy forests inhabited by primitive tribes, and the whole is only thinly peopled. The change going inland from the coast is remarkable.

3. **Central Gujarat** is much drier, and the 40-inch rainfall line passes through it. Rice can be grown on the low-lying stretches of alluvium bordering the

rivers, but millet and cotton are more important. The black cotton soil is found in the south. The eastern parts are more hilly and much covered by scrub. The climate in this part of Gujarat is healthier and so the area is more thickly populated than South Gujarat.

4. **Northern Gujarat** is still drier, and is on the whole a flat region with a poor sandy soil. Wherever the soil is richer the population is dense and much millet is grown; the poorer, sandy parts are inhabited by primitive peoples such as the Kolis, who in times past used to plunder their richer neighbours. Irrigation is not very important since few of the streams flow all the year. Cultivation is protected by tanks in this region.

5. **Kathiawar** is a large peninsula suffering from a precarious rainfall. In the centre is a group of forest-covered hills—the Gir Forest—among which most of the rivers have their source. These forests yield valuable timber. A large part of the rest of Kathiawar is a barren land of very little use. Over large areas the bare rocks rise to the surface and are not covered by any soil; between the rocky ridges are barren, sandy valleys. Here and there are a few more favoured spots, almost like oases in the desert. The people and their villages are concentrated in these richer areas, such as round Damnagar, or in the cotton-growing tracts near Dhari. Wherever irrigation is possible in Kathiawar, wheat becomes an important crop. Porbandar Stone, a limestone much used for building in Bombay, is quarried along the coast. There are salt deposits along the coast and lime which may become a source of wealth.

Politically, Kathiawar consists of a large number of small Indian States. The principal towns are capitals

of the States and exist as collecting centres in the more fertile spots of the peninsula.

6. **Cutch** is surrounded on three sides by the great marshy useless tract known as the Rann of Cutch, and on the remaining side by the sea. Like Kathiawar it is for the most part a barren, rocky, treeless and useless country, still drier than Kathiawar. It might also be counted as part of the Thar Desert which lies to the north.

7. **Communications.**—Running through Gujarat from south to north is the main line of the B.B. and C.I.R. —from Bombay to Delhi. The most important towns —Daman, Surat, Broach, Baroda and Ahmadabad—lie on this line. From Ahmadabad a branch runs into Kathiawar.

*Daman* in Southern Gujarat is a Portuguese possession.

*Surat* is a large and important town in Southern Gujarat, near the mouth of the Tapti River. Before the rise of Bombay, it was the leading town of the West Coast. The first factory of the East India Company was at Surat. The town has now nothing like its old importance. Broach, near the mouth of the Narbada River is also less important than formerly.

*Baroda,* in Central Gujarat the capital of the important State of Baroda, has modern cotton mills. It is also a large railway junction.

*Cambay* is a small port at the head of the Gulf of Cambay.

Those Indian States of Kathiawar which possess sea coast—the chief is Baroda—have of late years so developed their ports that these are beginning to prove a serious rival to Bombay. Bhavnagar has, for example, a deep sea port. The Kathiawar States have agreed to impose the same customs tariff as ports in

India, but the development of the Kathiawar ports proceeds apace and it seems likely that their future economic importance will be very great.

*Ahmadabad* is the great collecting centre of Northern Gujarat and stands high amongst the important cities of India. It has cotton mills and is also a railway junction.

### QUESTIONS AND EXERCISES

1. Draw a sketch-map of this region showing the parts into which it may be divided.
2. Write an account, illustrated by sketch-maps, of the climate of Gujarat.
3. What is meant by the Climatic Control of agriculture? How is the control seen in Gujarat?

# CHAPTER XXVII

## BOMBAY PRESIDENCY (THE WEST COAST REGION)[1]

1. **General Features.**—The West Coast Region is the narrow strip between the crest of the Western Ghats or Sahyadri Mountains and the sea. The Western Ghats are simply the western edge of the great Plateau of Peninsular India and so the West Coast Region is the strip between the edge of the Plateau and the Arabian Sea. The strip of plain between the mountains and the sea is very narrow; it is often interrupted by spurs of the hills which reach the coast. There is only one important island on this coast and that is the island on which the town of Bombay has been built. Notice that the coast is very straight. There are few bays which can be used as harbours and so there are few ports. Indeed there is only one really big port and that is Bombay. The next safe harbour, going southwards, is Marmagao, in the Portuguese territory of Goa. There is another reason why there should not be more ports. A great port cannot grow up unless behind it there is a large district full of people, who grow or manufacture things for export, and who can buy large quantities of goods brought by sea from other places. Behind the towns on the west coast there is a narrow plain, backed by high mountains which are very difficult to cross. Although the narrow plain is fertile and thickly populated it

[1] This natural region comprises the Konkan Region of Bombay Presidency (Districts of Thana, Kolaba, Ratnagiri and North Kanara) and the Portuguese possession of Goa.

is too narrow to give rise to a large port. There is one place, Bombay, from which the mountains can be crossed fairly easily.

2. **Climate.**—The West Coast Region is a very wet region—nearly the whole of it has more than 80 inches of rain in a year. Nowhere else in Peninsular India is the rainfall so heavy as it is in this natural region. Figures are added for three stations further south for comparison.

Study this table.

| Place | | Rainfall in one year |
|---|---|---|
| *Bombay—* | | |
| Bombay | ... | ... 80 inches |
| Matheran (on the mountain slopes) | ... | ... 208 ,, |
| Ratnagiri (on the coast) | ... | .. 96 ,, |
| Kumta ,, | ... | .. 142 ,, |
| *Madras—* | | |
| Irrikur (on the mountain slopes) | ... | ... 154 ,, |
| Calicut (on the coast) | ... | ... 119 ,, |
| Alleppey ,, | ... | ... 115 ,, |

Compare this with what is said about the rainfall of the other coastal strip regions. If you look at Figs. 34 and 43, you will see that the rain-bearing South-West Monsoon blows directly against the mountains of the west coast. Nearly all the rain falls when this wind is blowing, that is from May to October.

When we were studying temperature in Chapter IV, we noticed that places in the dry parts of the Plateau have a 'wide annual range' of temperature. That is, the difference between the hottest day and the coolest day is considerable. In Lahore we found the difference between the average temperature in January and the average in July is more than 36 degrees, and between the hottest and coldest months (January and

**Fig. 155. Political map of Peninsular India**

June) it is as much as 39 degrees. We noticed that in other parts of India, nearer the sea, the range of

temperature is less since the sea keeps the land cool in the hot weather and warm in the cold weather. In places where there is much rain, there is more cloud to hide the sun and these places do not get so hot in the hot weather. We should expect, therefore, that since the West Coast Region is a region near the sea and has a heavy rainfall that the range of temperature will be small. This is the case. In Bombay it is only 10 degrees, whilst in the south it is even less than 5 degrees. In the hot weather the cool sea breezes that we read of at the beginning of Chapter V make the climate of the Coastal Strip much more pleasant than that of inland places.

**3. Physical Features.**—If you look at Fig. 15 in Chapter III, you will see that part of the

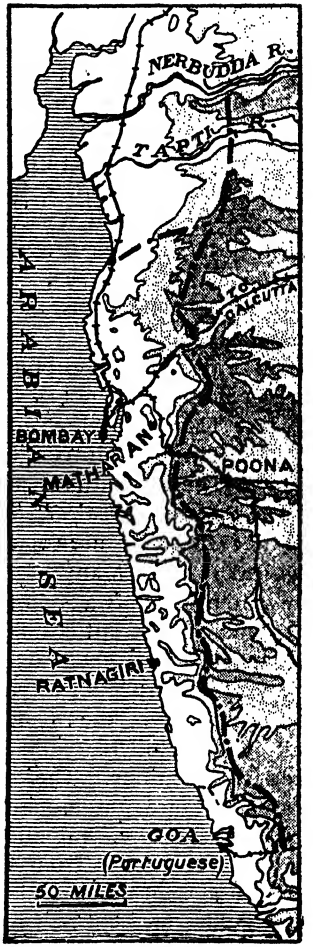



**Fig. 156. The West Coast Region**

Land over 500 feet, light dots; land over 2,000 feet, dark dots.

Western Coast Strip is built up of alluvium. Look at your atlas and notice the large number of small rivers which flow down from the High Western Ghats to the sea. Each of these rivers brings down mud, sand and stones which are spread out at the foot of the hills and thus the Coastal Strip is being added to. Notice also that the South-West Monsoon blows against the West Coast, and is often so strong that great waves are formed in the sea. These waves pile masses of sand against the coast and help to build it up. Although the coastal strip is so narrow—it is only 30 or 40 miles wide—we find we can divide it up into three narrower strips:—

(*a*) The steep slope of the Western Ghats.

(*b*) The flat alluvial land.

(*c*) The sand dunes piled up by the sea.

*The steep slopes of the Western Ghats* and the smaller foothills are usually clothed with luxuriant tropical forest. Many of the forests are evergreen, for the climate is always hot and steamy and there are very many different kinds of trees. One of the most important trees, however, is teak and the working of the teak forests is an important industry from Bombay to Travancore. The teak flourishes where the rainfall is not too great and so is not found in the very wettest positions. The many short rivers on the west coast are not much used for boats, they are too swift and rocky, but they can be used for floating the logs of timber from the forest to the coast. One day these swift rivers may be used for power. They will be 'harnessed' and made to work machines which make electricity. This has already been done with the rivers near Bombay and many of the cotton mills of Bombay are run by electric power. Much bamboo is also obtained in the forests and used for house

[*Photo*: *L. D. Stamp*

**Fig. 157. General view over Bombay, looking eastwards from Malabar Hill**

To the right is Back Bay; in the far distance can be seen the hills of the edge of the Plateau. The great harbour lies between Bombay Island and those hills.

building. Towards the south many rubber plantations are being formed.

*The flat alluvial land* forms the most important part of the West Coast Region. The water of the small streams from the hills is prevented from reaching the sea by the sand dunes and so spreads out to form large shallow lagoons. Many of the lagoons or backwaters open out to the sea and some are deep enough to form harbours for native craft. The banks of the lagoons are often lined with coconut plantations. Here too lie the numerous villages and every possible piece of land is sown with paddy interrupted at intervals by groves of areca-nut. The villages are different from those in other parts of India, for each hut has its own garden with coconut or areca-nut trees and the separate huts may be some distance apart. In olden days India was famous for its spices and the cultivation of the pepper plant is still important along the Malabar Coast (in the extreme south of Bombay) on the borders of the forest.

*The coast itself* is largely covered with groves of coconut trees. At intervals there are marshy mangrove swamps.

4. **Crops.**—Fig. 158 shows that forests cover nearly a quarter of this region. A large proportion is occupied by marshes, swamps, lagoons, etc. and is

'not available'. But nearly a half of the whole region is cultivated. Although the West Coast Region is thickly populated there is still a fair amount of

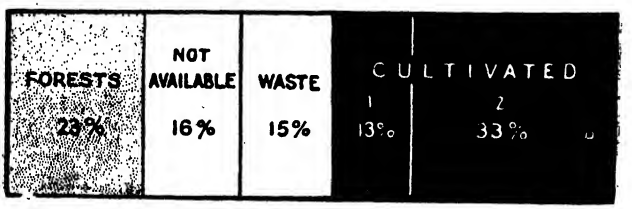



**Fig. 158. Cultivated land, West Coast Region**

waste land. Fig. 159 shows that rice is by far the most important crop. It covers half of the whole cultivated area. Notice that coconuts cover 6 per cent. of the area.

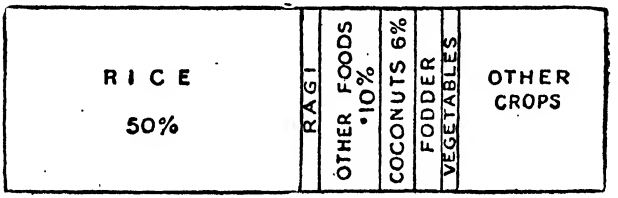
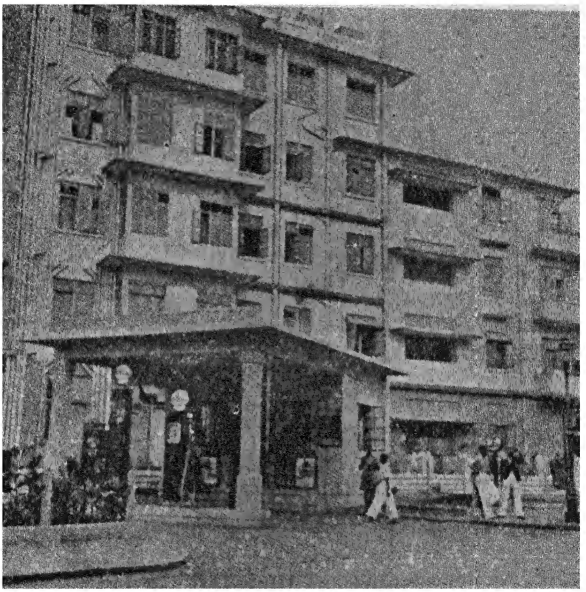



**Fig. 159. Crops of the West Coast Region**

5. **People.**—The West Coast Region is thickly populated. In the northern part which lies in Bombay there are over two hundred people to the square mile. Three-quarters of the people are engaged in cultivation. Nearly all the rice which they grow is required for food and there is little left for export. Many of the rice cultivators in the south are backward jungle tribes. The coconut palm is of great importance to the inhabitants. Their huts are thatched with its leaves, its wood is used for building or firewood,

the outer husk of the nuts furnishes a strong fibre used for making mats and ropes. The preparation of the fibre or 'coir-picking' is one of the most important village industries of the west coast. The dried

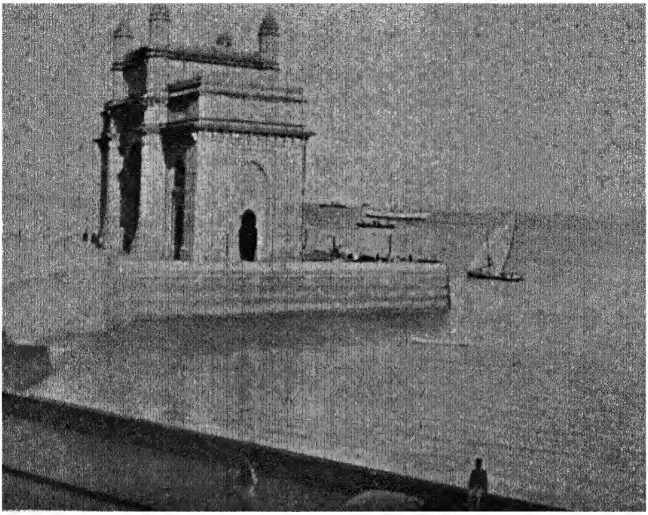


[*Photo*: *L. D. Stamp*

**Fig. 160. Modern 'flats' and an up-to-date petrol station, typical of the new buildings in Bombay**

kernel of the nut, called copra, is a valuable article of export. From copra, coconut oil is obtained. The juice of the coconut is drunk either unfermented or fermented and is distilled into a strong spirit called arrack.

6. **Towns.**—By far the most important town in this



[*Photo*: *L. D. Stamp*

**Fig. 161. Looking eastwards across Bombay Harbour**

Showing the Gateway of India (built to commemorate the Durbar of 1912), steamers and sailing vessels in the harbour.

region is Bombay. Going southwards from Bombay we pass the Portuguese possession of Goa which has a good harbour, to the small town of Kumta with its lagoon harbour used by small ships.

*Bombay* deserves a special description since it is the second largest city and the second largest port in India and has more than a million inhabitants. It has a fine harbour formed by an enclosed bay and the city itself is built on an island at the entrance (see Fig. 162). Fortunately Bombay is situated at the northern end of the West Coast Region where the Western Ghats can be easily crossed. Look at Fig. 202 and notice the routes leading out of Bombay. Behind Bombay, on the plateau, are the rich cotton growing lands (see Fig. 61). The raw cotton is sent

to Bombay where there are many large cotton mills. Study Figs. 162 and 202 carefully. They will help you to understand why Bombay has become so important.

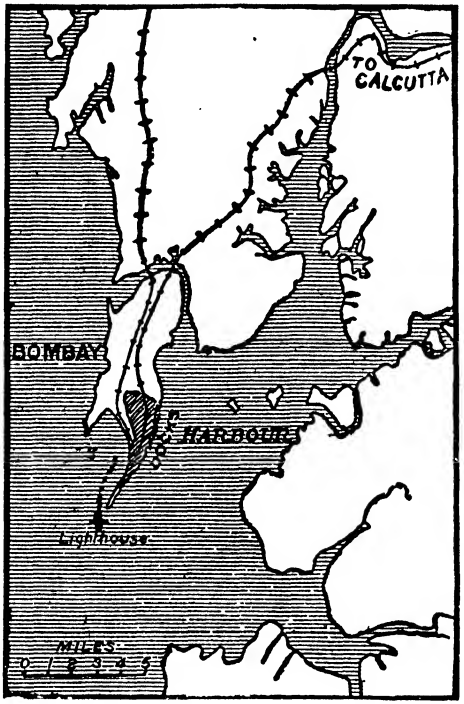



**Fig. 162. Sketch-map of Bombay Harbour**

Bombay is a very old centre. It was acquired by the Portuguese in 1530 and given by them to Charles II of England in 1661. The King granted it to the East India Company in 1668 and in 1708 it

supplanted Surat as the seat of the Governor of Bombay Presidency.

Before we leave this region there is one point to notice. There is no railway running through its length.

## QUESTIONS AND EXERCISES

1. Describe the climate of Bombay.
2. Write a short essay on the coconut palm.
3. Why is there no big port on the west coast, south of Bombay?
4. Describe the advantages of the position of Bombay.
5. Describe the geology and the soils of the West Coast Region.

# CHAPTER XXVIII

## BOMBAY (THE DECCAN LAVAS REGION OR THE BLACK SOIL REGION)[1]

1. **General Features.**—It is necessary to divide the great Plateau of Peninsular India into several parts. The north-western part has one feature in common over nearly the whole of it. Long ages ago it was covered by great masses of molten lava, poured out from fissures or cracks in the earth's crust. These great sheets of lava used to be known as the Deccan Trap and this natural region is still sometimes called the Deccan Trap Region. Geologists tell us that it is one of the largest spreads of lava in the whole world —covering nearly 200,000 square miles. Only in a few places, such as the Narbada Valley, have the rivers cut through and exposed the platform of old hard crystalline rocks below the lavas. Over the whole region the flows of lava have given rise to flat topped hills like those shown in Fig. 45. Even the hill ranges, such as the Ajanta Range, shown in Fig. 6, are really the edges of flat topped plateaus. The lavas have decomposed over most of the area to form a fine rich dark soil, very suitable for cotton and hence the name Black Soil or Cotton Soil Region. On Fig. 163 the Deccan Lavas Region is shown covering nearly the whole area where the lava is found. But the important Satpura Range, and further north the Vindhya Range, cross this region. The area to the

[1] The whole Deccan Lavas Region comprises roughly the part of Bombay east of the Ghats, except Dharwar, the whole of Berar, the western halves of Hyderabad, Central Provinces and Central India.

north is closely connected with the Rajput Upland

**Fig. 163. The Deccan Lavas Region**

Land over 500 feet, dotted; land over 3,000 feet, black.

Region and can be regarded as part of it. Like the rest of the Plateau of Peninsular India the Deccan

Lavas Region slopes gently from west to east, from the crest of the Western Ghats towards the Bay of Bengal. So we find most of the rivers, the Godavari and its tributaries, tributaries of the Kistna and Mahanadi all flow towards the east. But north of the Ajanta Range the country changes completely. The hills run east and west, and between them are the great westerly flowing rivers, the Tapti and Narbada, which have carved out deep troughs.

All this natural region—except strips in the Tapti and Narbada Valleys—is more than 500 feet above

**Fig. 164. Cultivated land, Deccan Lavas Region**

sea-level. Most of it is more than 1,000 feet and there are numerous areas over 2,000 feet.

2. **Climate.**—Unlike the last region, the Deccan Lavas Region is in the Rain shadow of the Western Ghats and nearly the whole area gets less than 40 inches of rain annually. There is a narrow strip, forming the eastern slopes just below the crest of the Ghats, which is wetter, and again towards the north-west there is a region of heavier rainfall. The driest parts are in the centre of the natural region. Much of this region is far from the sea and so there is a marked range of temperature.

3. **Crops.**—The soil in this natural region is very rich and so although it is a very dry region only a very, very little is wasted. Fig. 164 shows that more

than two-thirds is cultivated. Forests occur along the western margins, that is, on the slopes of the Western Ghats, and on the damper hill slopes elsewhere within the region—as in Hyderabad. Fig. 165 shows at once that the people do not eat rice; their staple food is millet. In the dry regions of India there are now two principal food grains, wheat and millet. Wheat is the most nourishing grain in the world. It has become the staple food of the people in dry regions like the Punjab and the Upper Ganges Valley. In this part of India, the Deccan Lavas, Region, the people do not yet live on wheat, but many of them like it

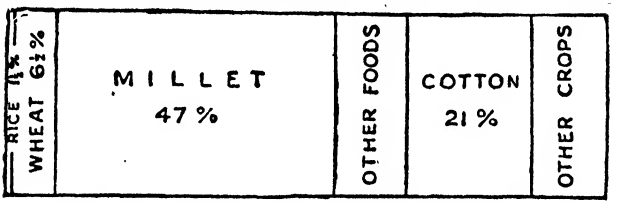



**Fig. 165. Crops of the Deccan Lavas Region**

very much and are growing more of it. A large quantity is grown in the Narbada Valley.

This part of India is the great cotton growing region. Look at Fig. 61 where cotton producing areas are shown. See how thickly together the dots are placed in this region. The United States produce more cotton than any other country in the world but India comes next. A very large proportion is grown on the soils of the Deccan Lava, especially in Berar.

Most of the cotton grown is native Indian cotton. The better American cotton requires irrigated land as in the Punjab. Although India is second in the world's production of cotton, there are many ways in which the cotton crop might be improved, especially as regards yield per acre. In some countries, such as

part of the United States, the amount obtained from each acre is more than double what it is in India. Look at the map and notice how conveniently the cotton growing country is situated for sending its cotton to Bombay. There are many mills at Bombay where cotton goods are manufactured and large quantities of raw cotton are exported.

4. **People.**—Although such a large part of the area is cultivated, it is not very densely peopled. There are only about 150 people to the square mile. You see they have to work hard and cultivate a large piece of ground before they can grow enough to feed themselves. The sticky black cotton soil is hard to plough and four or six bullocks have to be used to pull the plough. The towns of the region are really collecting centres, where the cotton is collected and put on the railways to be sent to Bombay. Many of them have now cotton mills of their own and are becoming industrial centres. The people over the greater part of this natural region speak Marathi; indeed the western half of Hyderabad, which also belongs to this natural region, is called Marathwara.

*Poona* lies near the crest of the Western Ghats, commanding one of the gaps or gateways down to Bombay.

It is cooler at Poona in the hills than at Bombay and so Poona has been made the hot weather Capital of Bombay Presidency. In the hottest weather the Governor lives at Mahabaleswar, on the crest of the Ghats.

*Sholapur* is an important centre further south.

Nearly the whole of this region forms part of the hinterland of the port of Bombay and the railways all radiate from Bombay as a centre.

# CHAPTER XXIX

## MADRAS

### I. THE MADRAS PRESIDENCY

Among the Provinces of India, the Presidency of Madras is now the largest but has not quite as many people as Bengal. The Presidency has grown up round the famous old centre of the East India Company, Fort St. George, which is now known as Madras. The Presidency has an irregular shape. Except for the important Indian States of Travancore and Cochin it includes nearly the whole of the southern part of the Peninsula, and stretches along the west coast northwards between Mysore and the sea. It stretches right along the East Coast as far as the boundary with Orissa, and in addition to the coastal regions includes a portion of the Deccan Plateau and the Eastern Ghats. The Presidency of Madras thus lies in the following natural regions:—

(*a*) West Coast Region, very wet.

(*b*) Carnatic Region or Tamil Plains forming the southern part of the East Coast.

(*c*) The Northern Circars Region or northern part of the East Coast.

(*d*) The Deccan Plateau.

### II. THE WEST COAST REGION

This region has already been described in part under Bombay. The southern part is similar but the alluvial plains between the hills and the sea are

broader. The whole region is very wet, and can be divided, still more distinctly, into three strips: —

(*a*) The sand dunes along the coast, largely covered by coconuts.

(*b*) The flat alluvial land behind the sand dunes. The water of small streams from the hills is prevented from reaching the sea by the line of sand dunes and so spreads out to form shallow lagoons. The lagoons have been connected by canals and it is possible to travel for hundreds of miles along the West Coast through these canals. Many of them are open to the sea and some are deep enough to form harbours for native craft. One, the harbour of Cochin, has been dredged near its mouth, and now forms a very important harbour on the West Coast open to large ocean going steamers. The banks of the lagoons are often lined with coconut plantations, whilst every suitable piece of land is planted with paddy. Here and there are groves of the areca or betel-nut palm and the pepper plant, for which this coast has so long been famous, is still grown.

(*c*) The slopes of the Western Ghats are covered with dense evergreen forests and forests cover nearly a quater of the whole region.

This region is densely populated. In Travancore there are as many as 1,200 people to the square mile. The staple food is, of course, rice, but many of the rice cultivators are backward jungle tribes. The coconut palm is of great importance to the inhabitants. Their huts are thatched with its leaves, the wood is used for building and for firewood. The preparation of the fibre of the husks or 'coir-picking' is an important industry and the dried kernel copra is exported. Coconut oil is also obtained and the juice of the coconut is made into a strong drink. Rubber

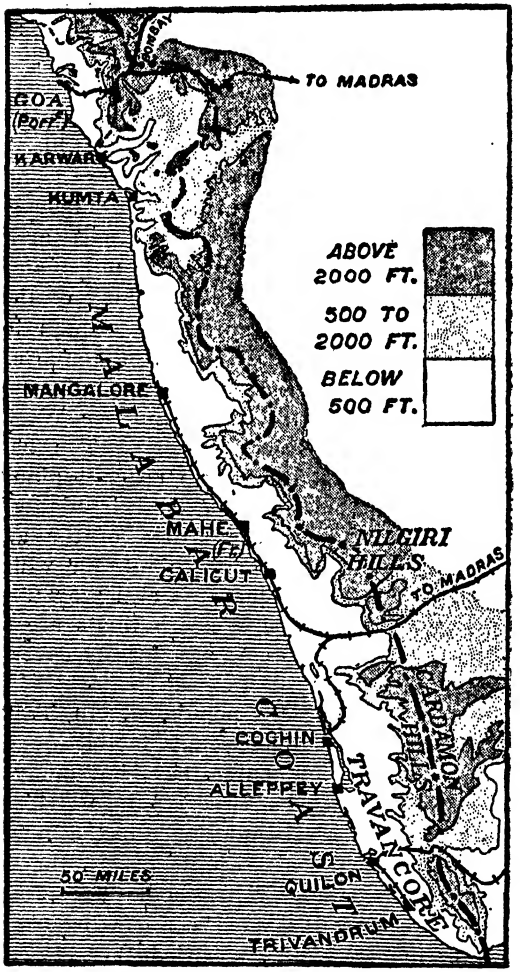



**Fig. 166. The West Coast Region (Southern part or Malabar Coast)**

planting is becoming a noteworthy industry in Travancore. Fishing is a common occupation along the coast.

*Mangalore* is a small town connected by rail with Madras.

*Calicut* is the fourth largest town in Madras and has a small timber trade. Like *Cochin,* it was once a famous spice port. *Cochin* in the Indian State of Cochin is likely to increase greatly in size and importance.

**The Madras States.**—Since 1923 the States of Travancore, Cochin and others have been placed in direct relation with the Government of India.

*The State of Travancore* has over 5 million people of whom one-third are Christians and their ancestors have been Christians for a very long time. The southernmost point of India, Cape Comorin, is in Travancore and the State stretches from the shores of the Arabian Sea to the crest of the Cardamom Hills.

*Alleppey* and *Quilon* in Travancore are growing industrial centres where coir rope and mats are made.

*Trivandrum* is the chief town of Travancore and can now be reached by railway from Madras.

## III. THE CARNATIC REGION OR TAMIL REGION

1. **General Features.**—In Chapter XIII we learnt that a natural region must have approximately the same characters throughout, but that sometimes there is a gradual change from one part to another. The area we are now going to study is like that. Near the sea there is a broad stretch of flat land—a coastal plain—but as we go inland small hills appear, then larger hills until we find that the western part of the region is quite hilly. So we can divide the Carnatic Region into two parts.

(*a*) The coastal plain of South India.

(*b*) The hilly western region.

This natural region is bounded on the west by the crest of the Cardamom and Nilgiri Hills which separate it from the West Coast Region and on the north by the slopes of the Eastern Ghats which separate it from the Deccan Region.

Fig. 15 shows that the coastal plain consists mainly of alluvium with some other young soft rocks and so this part is mainly agricultural. The hills consist of old hard crystalline rocks and mining industries are important.

2. **Climate.**—In its climate this natural region is quite different from all other parts of India. When the rainy South-West Monsoon is blowing this area is in the 'rain shadow' of the Cardamom and Nilgiri Hills and the high Deccan Plateau and during the months of May to September no part of it gets more than 20 inches of rain. In October, however, the South-West Monsoon begins to change round into the North-East Monsoon. Severe storms occur down the Madras Coast and heavy rain falls. In this natural region October is usually the rainiest month. In November and December the wind is blowing from the north-east, that is from the Bay of Bengal, and brings some rain to the Carnatic Region. On Fig. 42 you will see marked the part of India which receives more than 10 inches of rain in November and December. Since the wettest months are October, November and December, the rainfall graphs for the towns of this region are quite different from those of other parts of India. The total rainfall for this region is just over or just below 40 inches. Owing to the November and December rain coming from the Bay of Bengal,

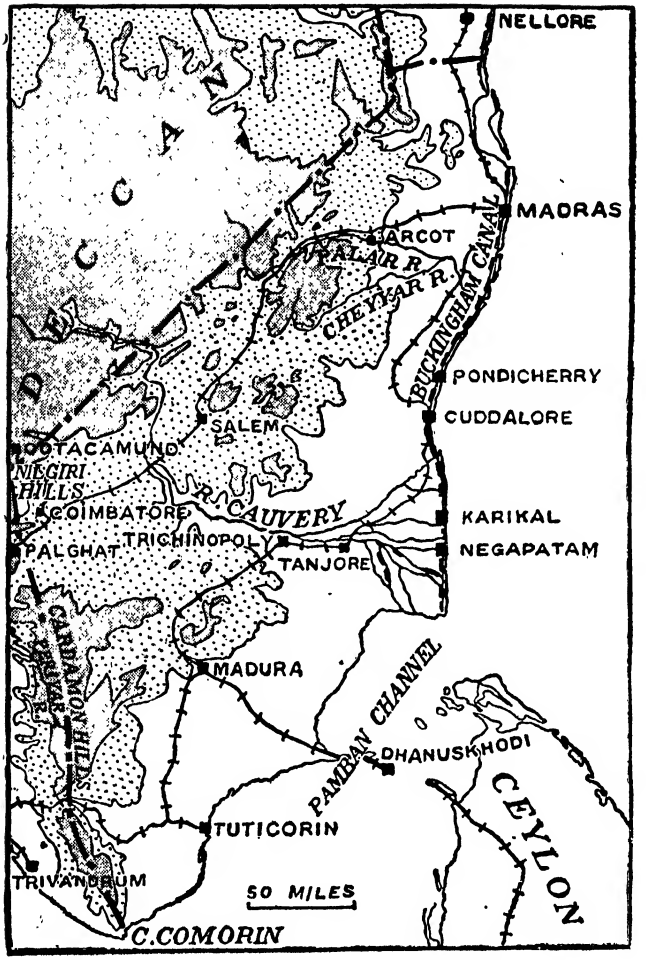



**Fig. 167. The Carnatic Region**

Land over 500 feet, light dots; land over 2,000 feet, dark dots

the coastal plain is wetter than the hilly regions to the west. Fig. 41 shows that the coastal plain of Madras has more than 40 inches of rain, the inland region less than 40 inches. Study the graph for Madras in Fig. 38 very carefully. Although Madras is on the coast, it is very dry from January to June and there are few clouds to hide the sun. The

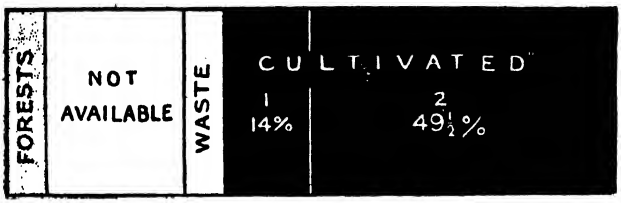



**Fig. 168. Cultivated land, Carnatic Region (coast)**

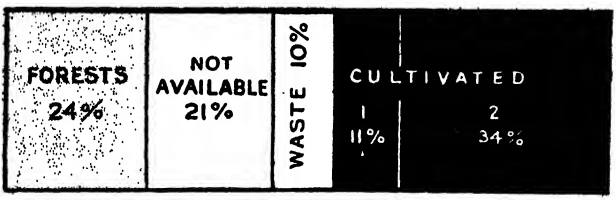



**Fig. 169. Cultivated land, Carnatic Region (hills)**

extremes of temperature are greater than on the damp West Coast but much less than in the dry plains of Northern India, or at places like Nagpur in the centre of the plateau. At Madras (see Fig. 27) the coldest month is January and the hottest is June. The difference between them is not quite 14 degrees. This is more than the range of towns of the West Coast (with a range of 5 to 10 degrees), but less than that of the interior (Nagpur has a range of 27 degrees).

Summarizing what we have said, the Carnatic Region falls into two parts:—

(*a*) Coastal Plain, most of which has just over 40 inches of rain, mainly falling in October, November and December.

(*b*) Hilly Western Region with less than 40 inches.

3. **Irrigation.**—Fig. 168 shows what a large part of the Coastal Plain is cultivated—nearly two-thirds of it. There is very little waste land and only a small area of forest. Look also at Fig. 169—that is the more hilly regions to the west. Here forests are important and occupy nearly a quarter of the whole. But again there is only a little waste land and nearly one half of the whole area is cultivated. Since much of the natural region gets less than 40 inches of rain on an average, in some years much less rain falls and the crops may fail. In times past terrible famines often occurred. There are many thousands of irrigation tanks (see Chapter VIII) in the Carnatic Region and many of them are very large (see Fig. 52). There are also the great irrigation works constructed by Government, by means of which thousands and thousands of acres of dry land have been made rich and fertile.

Let us look at the more important irrigation works constructed by Government in the Carnatic Region.

(*a*) The Periyar Project. The Periyar River flows through Travancore to the Arabian Sea. In the last chapter you learnt that Travancore has a very heavy rainfall and so there is always plenty of water in the Periyar River. A great wall was built across the valley of this stream and the valley was turned into a great lake. A tunnel then was made through the mountain and the water taken through it to the Madras side of the hills. The water was then taken

[*Photo*: *L. D. Stamp*

**Fig. 170. Cultivation in South India on sand banks**

In most of the drier parts of India, the banks of sand and alluvium left by the sides of rivers during the low water season are very fertile. This picture shows the big railway bridge necessary to cross the river when it is in flood and the young beans planted on the sand bank.

down canals into the flat land round Madura where it waters thousands of acres of land.

(*b*) The Poini, Palar and Cheyyar Systems. South of the town of Arcot, three rivers, the Poini, Palar and Cheyyar have been dammed and their waters irrigate a large tract of country west of Madras.

(*c*) The Cauvery Delta System. One of the oldest irrigation works in India is the great system of canals which now covers the whole of the Delta of the Cauvery River. The system was started hundreds of years ago, reconstructed by the British nearly a hundred years ago and continually improved since then. Now 1,000,000 acres are irrigated; there are 1,500 miles of main and branch canals and 2,000 miles of distributaries. Further up the river, a huge dam has been

built at Mettur, and large areas in Trichinopoly and Tanjore Districts, which up to now have produced only dry crops, will be available for rice cultivation. The works at Mettur are also made to produce cheap electric power.

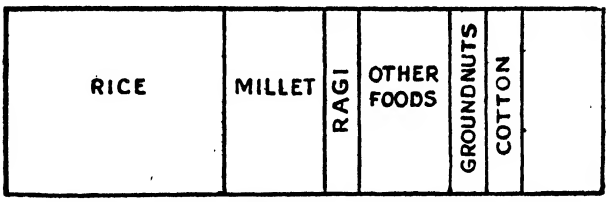



**Fig. 171. Crops of the Carnatic Region (coast)**

4. **Crops.**—Now that we have seen how part of the land is watered, let us see what crops are grown. Look at Figs. 171 and 172. On the flat lands of the plain, rice is the most important crop and is mostly

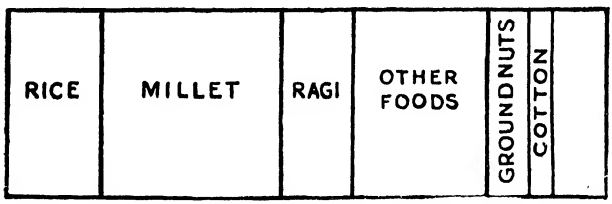



**Fig. 172. Crops of the Carnatic Region (hilly parts)**

grown on the irrigated land. On the drier land which is not irrigated millet is grown. Fig. 172 shows that on the hilly regions where there are few areas flat enough for irrigation or for making paddy fields, millet is more important. So altogether in the Carnatic Region about equal quantities of rice and millet are grown and both form the staple foods of the people. Compare this with the West Coast Region. Notice that both groundnuts (grown for the sake of

the oil) and cotton are important crops. On the hilly lands the short stapled Indian cotton is grown but on the irrigated lands it is possible to grow the long stapled American. Sugarcane and tobacco are cultivated over most of the area. All down the coast itself on the sandy dunes are coconut plantations. See what is said in the last chapter about the uses of the coconut.

On the slopes of the Nilgiri Hills—that is really on the slopes of the Deccan Plateau—there are important tea plantations or tea gardens as they are called.

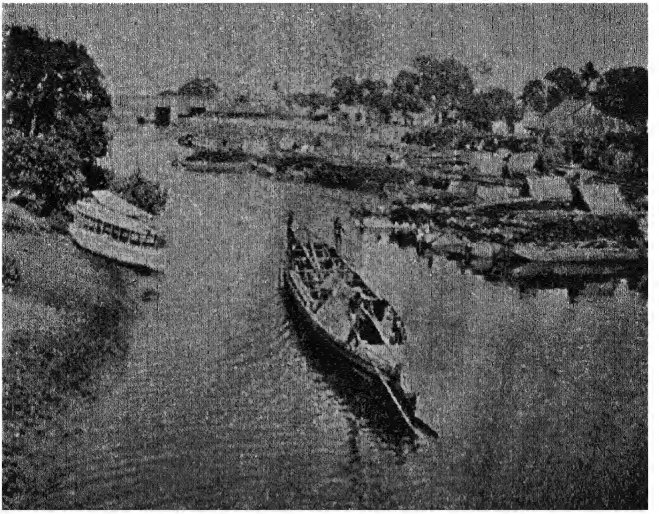
The forests grow on the hill slopes, wherever there is sufficient moisture. The most important trees are teak and sandalwood. The teak forests are carefully looked after by Government—the best are in Coimbatore and on the slopes of the Nilgiri Hills. Other trees with very useful timber are being planted.

The minerals of this region are not very important but mica is mined in the Nellore District and much salt is obtained from the sea along the coast.

An important industry along the coast is fishing and pearl-fishing.

5. **People.**—The people of this natural region are nearly all Tamil-speaking. Fig. 80 shows that the area where Tamil is spoken is very nearly the same as the Carnatic Natural Region. The term Carnatic is not a good one and we may call this the Tamil Region. In the hills, such as the Nilgiris, there are various primitive hill tribes. The population over the whole region is dense, being over 400 to the square mile.

6. **Towns.**—Fig. 167 shows that there are no natural inlets which can be used as harbours along the east coast. Yet there are many small ports. At all of them the steamers have to anchor two or three

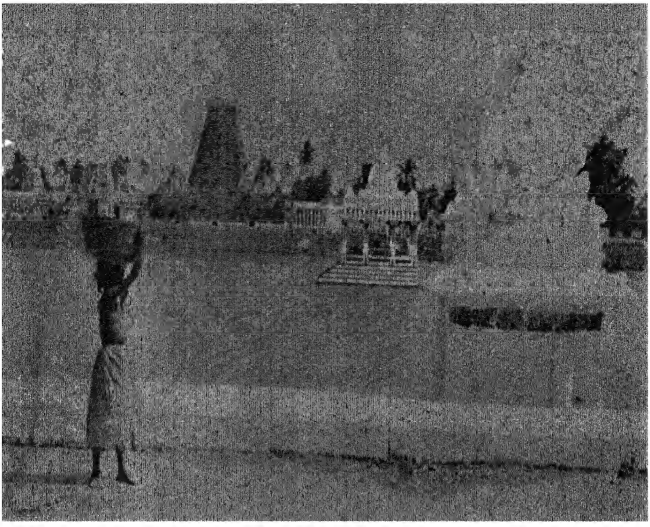


[*Photo*: *L. D. Stamp*

**Fig. 173. The Buckingham Salt-water canal at Madras**

miles away from the shore and the passengers are sent to the shore in small boats. The small native boats used for the purpose are called mussoola. The landing is often dangerous because of the size of the waves and the 'surf' which they make. The ports cannot be used at all in rough weather. Madras is the only port which has an artificial harbour, built at great cost and only finished in 1909.

Madras is the third largest city in India and the fourth most important port. The larger ports are Calcutta, Bombay and Karachi. Half a million people live in Madras. Madras has not nearly such a large hinterland as Bombay or Calcutta and there are other ports which share in the trade. The principal export is leather and the 'tanning' of hides and skins is a very important industry. There are also



[*Photo*: *L. D. Stamp*

**Fig. 174. A typical South Indian temple and temple tank at Madras**

numbers of cotton mills in Madras and both cotton goods and raw cotton are important exports.

*Pondicherry* on the coast south of Madras is a French town and the capital of the French possessions in India.

*Cuddalore* is another small port.

*Tuticorin* is the port for the southern part of the region and has a regular service of steamers to Colombo (Ceylon). It is a centre of the cotton industry and is famous for its pearl fisheries.

*Madura* is an important inland centre in the midst of rich irrigated lands. Madura has also a dyeing industry.

*Trichinopoly* and *Tanjore* are other inland centres.

*Ootacamund*, high up on the Nilgiri Hills, is the hot weather capital of Madras.

*Rameshwaram* is a famous place of pilgrimage and the temples of many of the southern cities are very famous.

7. **Railways.**—Notice the railways which run from Madras. There is a broad gauge line along the coast to Waltair (Vizagapatam) and eventually to Calcutta. Another broad gauge line runs across the peninsula to Bombay. The South Indian Railway forms a network of lines to the south of Madras. Notice how the railway to the West Coast (Cochin and Calicut) passes through the gap between the Nilgiri Hills and the Cardamom Hills. Southward from Madras a metre gauge railway runs to Madura and Tuticorin which used to be the main route to Ceylon. But now there is a railway to Pamban on the chain of islands towards Ceylon. From the furthest point (Dhanushkodi) to the terminus of the Ceylon Railways at Talaimannar is only twenty-two miles of shallow sea. The sea between Ceylon and South India is very shallow here so that ocean steamers from Colombo to Madras have to go round the south of the island of Ceylon.

Running northwards and southwards from Madras is the Buckingham Navigation Canal—nearly 250 miles long. This enables goods to be carried cheaply and easily by water without the dangers of the stormy sea (see Fig. 173).

## IV. THE NORTHERN CIRCARS REGION[1]

1. **General Features.**—If you look again at Fig. 12 in Chapter II or, better still, the physical map of India in the atlas, you will see that there is a strip

[1] Comprising the Districts of Vizagapatam, Godavari, Kistna, Guntur and Nellore of the Madras Presidency. Orissa really belongs to the same natural region.

of low land running down the east coast between the plateau land and the sea. The part we are going to study stretches from north of Madras, about the town of Nellore, right up the east coast past Vizagapatam.

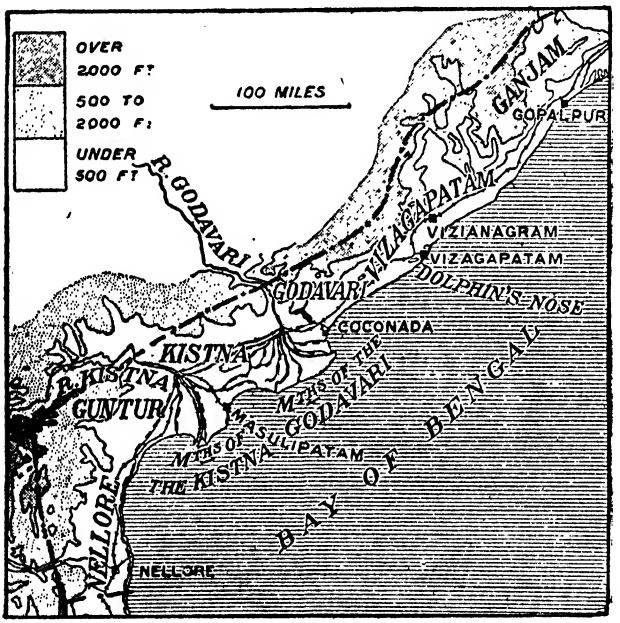



**Fig. 175. The Northern Circars Region**

Ganjam now forms part of Orissa.

It is continued into the Province of Orissa. The Northern Circars Region is, then, a 'Coastal Strip'. It is not quite right to call it a coastal plain because in some parts there are many small hills. In days gone by this natural region formed the kingdom of Kalinga. This region is bounded on the west by the hills of the Eastern Ghats. The central part of the

region is formed by the big deltas of the Godavari and Kistna Rivers. Further north, in the Vizagapatam District, it consists of a coastal plain with many small hills. Some of these small hills like the 'Dolphin's Nose' at Vizagapatam come right to the sea. In the north is the delta of the Mahanadi River. Notice also the large shallow Chilka Lake—an arm of the sea which has been cut off by the growth of the Delta.

The rocks comprising the flat parts are alluvium and young soft rocks and afford a fertile soil, but the small hills consist of old hard crystalline rocks and very little will grow on them. Some of these old,

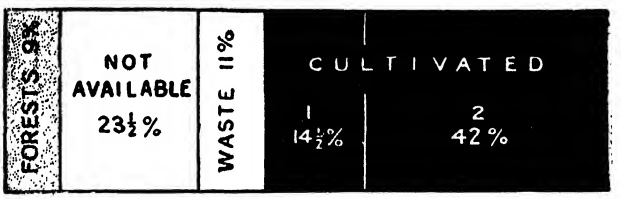



**Fig. 176. Cultivated land, Northern Circars Region and Orissa**

hard rocks yield valuable minerals and much manganese ore is obtained near Vizagapatam. Along the sea shore there is usually a strip of sand, and sand blown by the wind may do great damage to crops growing behind. Around the deltas of the rivers mangrove swamps may be found. The soil of the mangrove swamps is full of salt and the winning of salt is an important industry in Orissa. In the west of the region are the slopes of the Eastern Ghats, often covered with forest.

2. **Climate.**—If you compare this region with the last you studied—the Carnatic Region—you will notice that it is very similar. The plain is narrow,

*Photo: L. D. Stamp*

**Fig. 177. The village tank at Waltair**

This photo was taken in the evening when the water buffaloes had been brought down for their evening bath after the day's work.

and the whole area much narrower. Its climate, however, is quite different. In the north the rainfall is well over 40 inches, but as we go southwards it gets drier. Vizagapatam has just less than 40 inches. Further south it is still drier, but when we get into the District of Nellore it begins to get damper again. In the Carnatic Region you learnt that the rain fell mostly in October, November and December and so that region was different from the rest of India. In the Northern Circars Region it falls when the South-West Monsoon is blowing from May to September which is quite different. Notice that the wind blows parallel to the coast, otherwise the rainfall would be much heavier than it is.

3. **Crops.**— We have seen in Chapter IX how important rainfall is to crops; where the rainfall is more than 40 inches, the most important food crop is generally rice, where it is less than forty inches millet is most important. Let us see how far this is true of the Northern Circars Region. We have just said that this natural region is wettest in the north, that is, in Orissa where no millet is grown at all. In the Ganjam District of Orissa we find five times as much rice is grown as millet. The driest district in the region is Guntur and here ten times as much millet is grown as rice. The Districts of Kistna and Godavari have both a rainfall of less than forty inches, but the flat deltas of the two rivers Kistna and Godavari are irrigated (see Fig. 175 where some of the irrigation canals are marked) and so much rice is grown. This variation of crops is an

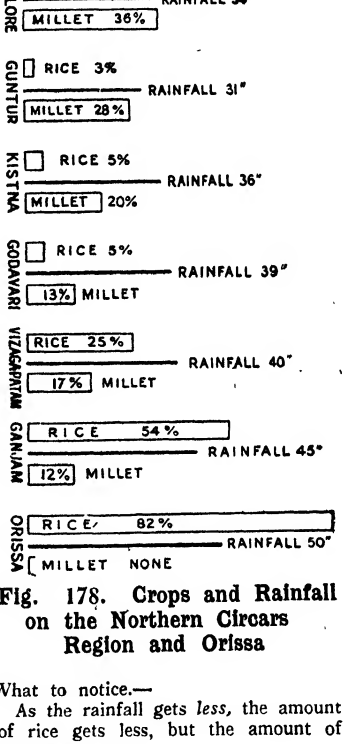



**Fig. 178. Crops and Rainfall on the Northern Circars Region and Orissa**

What to notice.—
As the rainfall gets *less*, the amount of rice gets less, but the amount of millet gets *more*.
(This diagram does not count crops irrigated by canals.)

important example of what we call 'climatic control of vegetation'. It is illustrated in Fig. 178. Study this carefully. Besides rice and millet other food crops are grown down this coast. Another valuable crop is formed by spices, for which India has so long been famous.

In the damper parts of the Western hills there are important forests where the sal tree grows.

Fig. 176 shows the proportion of this natural region devoted to different purposes. Nearly a quarter of the area cannot be used for cultivation—it consists of rugged hillocks giving pasture to sheep, swamps, etc. Only a very small part of the area is left 'waste'. The people who live in this natural region speak Telugu. It is a rich area and so there are as many as 345 people per square mile.

4. **Towns.**—There are no good natural harbours down the east coast of India. You learnt in the last chapter that Madras has now a fine artificial harbour, but the part of the coast we are studying in this chapter is not so fortunate. In many places steamers have to anchor two or three miles from the shore and the goods are brought by the small mussoola boats through the surf to the land. Along part of the coast there is a bank of mud or sand about a mile or two from the shore and the big waves break on this and so their full force does not reach the shore. The best port of this natural region is *Vizagapatam* which is partly sheltered by a rocky headland called the Dolphin's Nose. A fine new harbour, completed in 1933, has been built here, and the hinterland of the port has been greatly enlarged by the construction of a railway to Raipur, in the heart of the rich Chhattisgarh plain. Another large port is *Coconada* which also has a rich hinterland. Other ports are

*Masulipatam, Calingapatam* and *Gopalpur.* Notice the position of these ports in the map (Fig. 175) and the extent of their hinterlands. *Vizianagram* is the only inland town of any size. Running right through this district, connecting to the north with Calcutta and to the south with Madras is a broad gauge railway. Fine bridges carry it across the Mahanadi, Godavari and Kistna Rivers. The numerous canals which exist in the deltas of these rivers have been made for irrigation, not for transport traffic.

## V. THE DECCAN PLATEAU

The 'Deccan districts' of Madras—Bellary, Kurnool, Anantapur, Cuddapah and part of Chittoor—lie on the Deccan Plateau. The main features of the plateau are described under Mysore. *Bellary* is the largest town in the Madras Deccan Districts. *Kurnool* stands at the head of a canal, the Kurnool-Cuddapah Canal, which irrigates a valley between the Kistna and Penner Rivers. This canal forms a small part of an enormous scheme to irrigate much of the drier parts of northern Madras, but was the only part to be finished and cost five times the original estimated cost. The authorities were deceived by the great success of canals in northern India. Here the water is available only during the monsoon and the soil is different —less suitable for irrigation.

## VI. THE EASTERN GHATS

The Eastern Ghats are partly occupied by the 'Agency Division' of Madras—but much of the wild country here has been transferred to the Province of Orissa.

## QUESTIONS AND EXERCISES

1. Compare the climate of the Carnatic Region with that of the West Coast.
2. Which has the better position, Madras or Bombay? Why?
3. Give an account of irrigation in South India.
4. Why is South India less liable to famine than in years past?
5. Study Fig. 167. Find five gaps between ranges of hills used by railways. Mention towns (gap towns) guarding some of them.
6. Find another region in the world which you think is like the Northern Circars Region.
7. Compare the Northern Circars Region with the West Coast Region.
8. Compare the Northern Circars Region with the Carnatic Region.
9. What is meant by Climatic Control of vegetation?
10. Draw sketch-maps showing the advantages or disadvantages of the position of Vizagapatam and Coconada.

# CHAPTER XXX

## ORISSA

In 1937 the Province of Bihar and Orissa was split into two. The new Province of Orissa includes the Orissa coastal strip, together with the district of

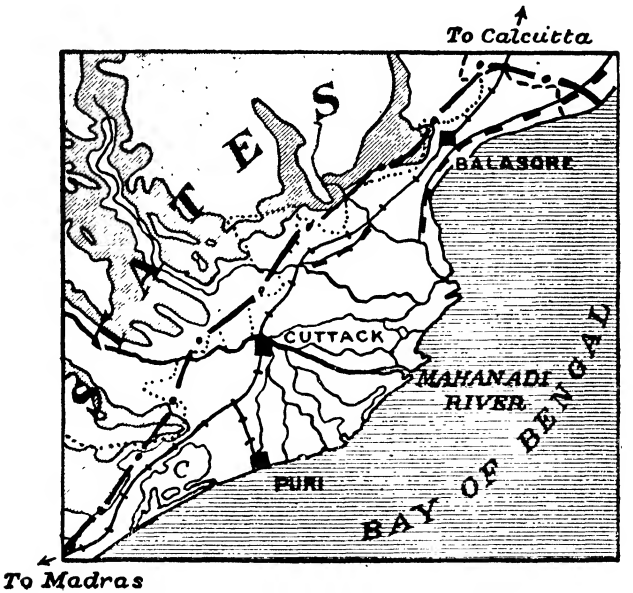



**Fig. 179. The Orissa Coastal Strip**

Land over 500 feet with lines; land over 1,000 feet, dotted; C, Chilka Lake.

Ganjam transferred from Madras, parts of the wild forested hills of the Eastern Ghats, and the southern

half of the Chota Nagpur Plateau. The new province has 9 million people.

The most important part of the province is the Orissa coastal strip. *Cuttack* is the old capital of the kings of Orissa and near it a site has been chosen for the new Provincial capital. One of the most important towns in Orissa is *Puri* on the coast, which is a famous place of pilgrimage. Fishing is important at Puri and in the Chilka Lake.

A large part of the coastal strip is formed by the rich rice-growing delta of the Mahanadi (see Fig. 178) and a canal connects the delta with the Hooghly River near Calcutta (see Fig. 179). On this canal is *Balasore* where formerly English, Dutch and French factories existed before the rise of Calcutta.

The part of the Chota Nagpur Plateau lying in the Province of Orissa is like that in the Province of Bihar. On the plateau are coalfields at Talcher and rich deposits of iron ore especially in the feudatory states of Mayurbhanj, Keonjhar and Bonai.

# CHAPTER XXXI

## MYSORE

**General.**—The important Indian state of Mysore is ruled by a Maharaja of the family which has governed the state, except for short periods for the past 740 years. Every year in September or October the Dasara festivities last for ten days and the Maharaja sits on his jewelled throne in his palace in the city of Mysore to receive the homage of his subjects, on the tenth day going in procession through the city. The state has a Constituent Assembly, elected by the people, and a Council of Ministers. It has an area of 29,483 square miles and a population of about seven millions —mostly Hindus.

Mysore lies entirely on the high southern part of the Deccan Plateau; nearly the whole is more than 2,000 feet above sea-level and many parts more than 3,000. Mysore is thus famed for its pleasant climate, its varied scenery and its progressive government.

**General Features of the Deccan Plateau**[1].—We have now studied the coastal strips bordering the plateau of Peninsular India and in this section we are going to take the southern part of the plateau, that is, the highest part and where the surface has not been cut into by rivers so deeply as it has further north.

We have called this natural region the 'Deccan Plateau'. In some books you will find the whole of Peninsular India called the Deccan, but the Deccan

[1] The natural region of the Deccan comprises the whole of Mysore, the Deccan districts of Madras (Bellary, Kurnool, Anantapur, Cuddapah and part of Chittoor), the Dharwar District of Bombay and the eastern half of Hyderabad.

properly means only the southern and the south-eastern parts of it.

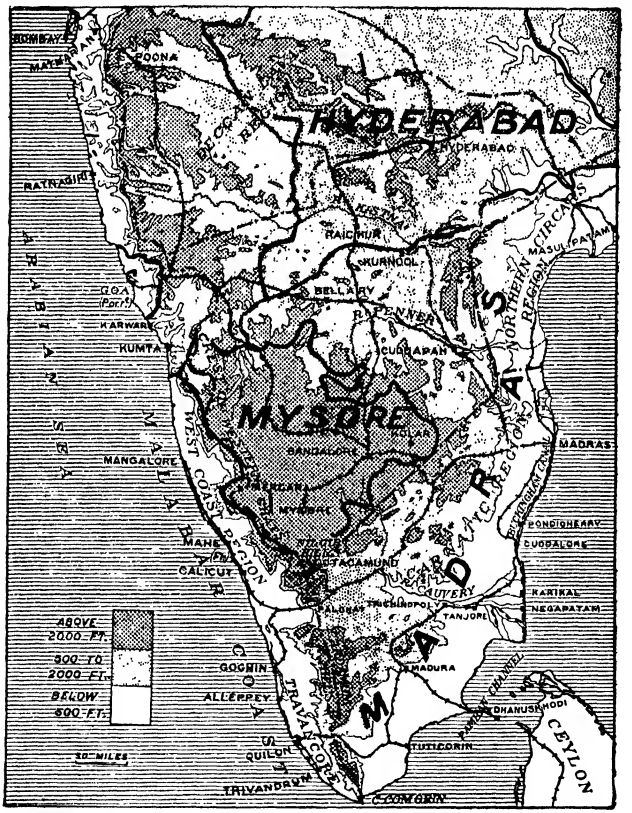



**Fig. 180. Map of Southern India**

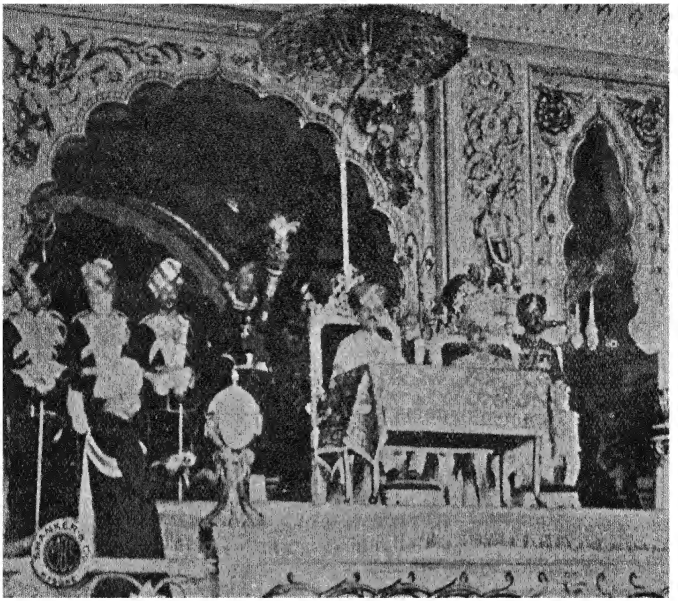
If you look at Fig. 181 you will see that practically the whole of the Deccan Plateau is more than 500 feet above sea level. Fig. 181 shows us, too, that practically the whole of the southern part, the State of Mysore,

is more than 2,000 feet above the level of the sea

**Fig. 181. The State of Mysore in relation to the natural region of the Deccan Plateau**

Land over 500 feet, light dots; over 2,000 feet, heavy dots.

and there are large areas in Hyderabad more than 2,000. But the surface of the plateau is by no means



[*Photo*: *Shanker & Co.*

**Fig. 182. The Maharaja of Mysore on jewelled throne during the Dasara Festivities**

flat. The many rivers have carved out for themselves broad valleys in the surface of the plateau. In Mysore the important rivers are the Cauvery and its tributaries which flow to the south-east and the tributaries of the Kistna and Penner Rivers which flow to the north-east.

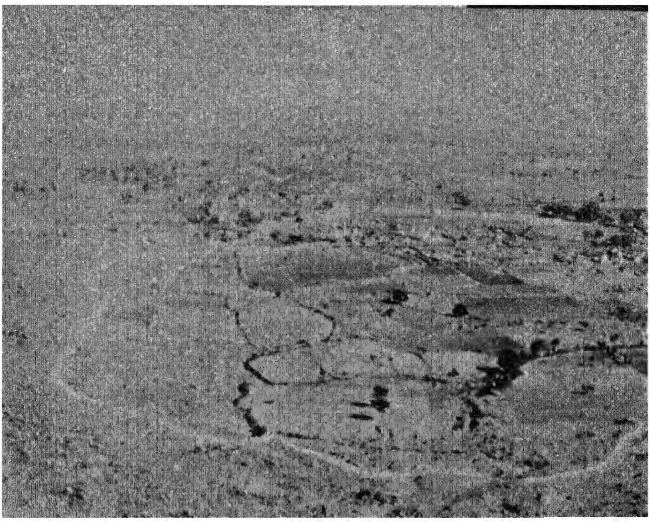
There are hills which stand out from the surface of the plateau. These include Nandi (4,851 feet), used as a hill station near Bangalore, Bababudan Hills towards the north-west of the State, the smaller sacred hill of Chamundi which overlooks the city of Mysore, whilst in the south the Nilgiri Hills lie just across the border in Madras Presidency and reach 8,760 feet in height.

**Climate.**—The high western edge of the plateau is called the Western Ghats. You remember that the Deccan is in the rain shadow of the Western Ghats and receives less than 40 inches of rainfall. Some parts of this natural region do not even get 20 inches of rain in a year. The only parts which receive a moderate rainfall are the slopes of the Western Ghats. The Deccan is, then, a dry region except for a strip along the west near the Western Ghats. What is worse, too, the rainfall is irregular, in some years it is quite good, other years having practically none, and so famine is much to be feared. The people store water in tanks, but in bad years the tanks are not even full in the rainy season.

Most of the land being high, it is colder in the Hot Season than places in the plains, though some places a long way from the sea have greater extremes of temperature than places on the coast.

**Minerals.**—The Plateau of Peninsular India consists of old hard rocks—'Crystalline Rocks'. The change into crystalline rocks took place a very, very long time ago and the Deccan has been a solid plateau of very old, hard rocks for ages and ages. Long before the great Himalaya mountains were formed, the Deccan—indeed nearly the whole of Peninsular India —was already a high plateau.

In some parts of the world similar crystalline rocks contain many valuable minerals, but in the Deccan they are not so rich as in some places. Gold is found at Kolar in Mysore, and the Kolar Goldfield produces in some years nearly half a million ounces of gold which may be worth as much as 3 crores of rupees. Four companies work the mines and employ 20,000 men. Some of the mines are very deep—nearly 1½ miles. Other important minerals include manganese



[*Photo* : *L. D. Stamp*

**Fig. 183. General view of Deccan Plateau country, taken from Chamundi Hill, Mysore**

Notice the barren useless slopes of the rocky hills in the foreground, the landscape of rolling ground with irregular fields (arranged where the soil is good), the scattered trees and the village.

ore and chromite, exported for use in the manufacture of iron and steel. Mysore has its own iron and steel works at Bhadravati (where charcoal is used as fuel).

The old crystalline rocks yield a somewhat poor dry soil, so that although a large area is cultivated, the yield of the crops is only moderate.

**Irrigation.**—Let us now look at the uses to which the land is put (Fig. 184). In the Deccan we notice there is a rather large proportion of waste land—much more than in the thickly populated regions of the East Coast. Forests cover a large area too. You say how can that be when most of the natural region has much less than 40 inches of rain and forests like more? Well, most of the forests are found in the

west of the natural region, that is, on the slopes of the Western Ghats and the damper slopes of other hills. In Mysore the forest-clad western half is called the malnad; the drier, flatter eastern part the maidan. In the driest parts (see Fig. 44) there is very little

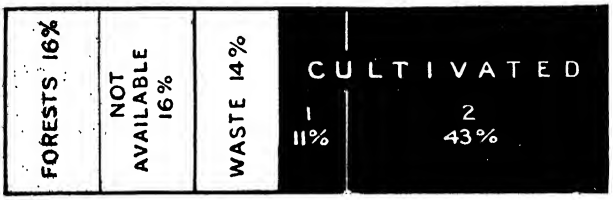



**Fig. 184. Cultivated land, Deccan Plateau**

forest. The people are industrious and much more than half the land is cultivated.

The state of Mysore has more than 38,000 irrigation reservoirs (more than an average of one for every square mile), of all sizes from mere ponds to gigantic

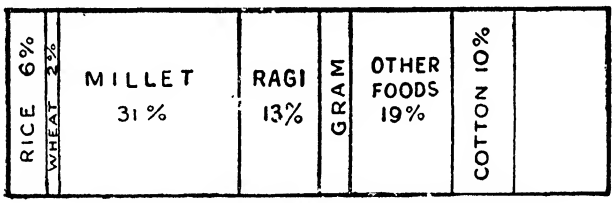



**Fig. 185. Crops of the Deccan Plateau**

dammed-up lakes constructed by Government. The river Cauvery and its tributaries provide most of the water. The largest scheme is the recently completed Krishnaraja Sagar, on the Cauvery—10 miles from Mysore City, which, in addition to irrigating a large area, creates hydro-electric power. The dam is $1\frac{3}{4}$ miles long and creates an artificial lake more than 40 square miles in extent, and is one of the most

important irrigation works in the whole of India. The reservoir is the second largest in India and below the dam beautiful gardens with innumerable fountains and lit by multitudes of coloured lights present a spectacle unrivalled in India and perhaps in many parts of the world. Another important hydro-electric scheme is at Sivasamudram near the famous falls on the Cauvery which has been greatly extended since it was first developed in 1902 and now has over 500 miles of high tension transmission lines and supplies 130 towns and villages—including the Kolar Goldfield 92 miles away. Another important irrigation work is that at Vanivilas Sagar on the Vedavati River.

**Crops.**—Fig. 185 shows how different this natural region is from the others studied. There is not sufficient rainfall and very little flat land where rice can be grown. The places where most rice can be grown are on the flat floors of the broader valley. Nearly everywhere millet is the staple food of the people and the most important crop, as in nearly all the drier, hilly or plateau parts of India. Another important crop is cotton, but it is not as important as it is in the Deccan Lavas Region, where the soil is better and more suited to cotton. Sugar is being increasingly grown on the land watered by the great irrigation works. The sugar factory at Mandya is one of the largest in India.

Some years ago coffee planting used to be an important industry in Mysore, but disease destroyed many of the trees. Worse even than that, huge quantities of coffee are grown very cheaply in the far away South American country of Brazil and this cheap coffee is sent to all parts of the world and so it does not pay to grow coffee in India except in a few places. This is an important example of how India's trade

and industries may be affected by parts of the world far away.

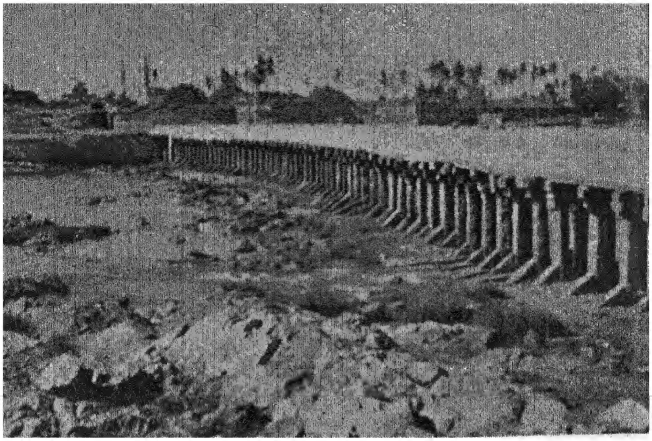
Sheep are reared all over the Deccan Region and flourish on the dry grasslands of the hill-sides. The Deccan region has nearly a quarter of all the sheep in India and a large proportion are in Mysore. There are many cattle too, but in the drier parts fodder has to be grown for their food.

**People.**—In Mysore, nearly all the people speak Kanarese (or Kannada as it is sometimes called). Most of the people are Hindus. The Deccan region is not very thickly peopled. In Hyderabad there are only about 150 people to the square mile, in Mysore 200 and in Madras 140. Compare this with the coastal regions.

**Towns.**—*Mysore* is the capital of Mysore State and the Maharaja of Mysore has a very fine palace there. Mysore City has a Government Sandal Oil Factory and also silk-weaving factories equipped with modern machinery. The Mysore University buildings are also noteworthy.

*Bangalore* is larger than Mysore, it is nearer the centre of Mysore State and is easily reached from Madras by broad gauge railway (the line from Bangalore to Mysore City is only narrow gauge). It is the seat of Government and the most important town in Mysore. The high healthy situation led to the establishment there of the Indian Institute of Science—an all-India institute—and a British military station. Bangalore has a soap factory and is a growing industrial centre. The town is supplied with water from the large artificial lake of Chamaraj Sagar.

Great historical interest attaches to *Seringapatam* on a small island formed by the River Cauvery which was for long the capital and was held by the rebel



[*Photo*: *L. D. Stamp*

**Fig. 186. The famous bridge across the Cauvery at Seringapatam**

ruler Tipu till he was defeated and killed there by the British in 1799.

**Communications.**—Apart from the line from Madras to Bangalore, the Mysore railways are metre gauge. Much progress has been made with road construction and the scenery renders the State an attractive one for tourists. It includes within its bounds the magnificent Gersoppa Falls.

*Coorg.* The tiny British province of Coorg with its principal town, Mercara, lies to the north-west of Mysore on the slopes of the Western Ghats. Much of it is forested.

### QUESTIONS AND EXERCISES

1. Compare the crops of Mysore with those of the West Coast. Why are they different?
2. This region is nearly as dry as the Carnatic Region but not nearly so much is irrigated. Why is that?
3. Write an account of the mining industries of Peninsular India.
4. Write an account of the Cotton Industries in India.
5. Compare the climate and productions of the Deccan Lavas Region and the Deccan Region.

# CHAPTER XXXII

## HYDERABAD OR THE NIZAM'S DOMINIONS

**General.**—Hyderabad is the largest Indian state and is ruled by His Exalted Highness the Nizam. The son of H.E.H the Nizam is the Prince of Berar for Berar now belongs to the Nizam but is administered with the Central Provinces, the Indian Dominion paying an annual rent of 25 lakhs to the Nizam. Hyderabad has an area of 82,698 square miles and a population of 14½ millions; Berar has an area of 17,710 square miles.

**Physical Features.**—The State of Hyderabad lies wholly on the Plateau of Peninsular India and nowhere reaches the coast. The western half, known as Marathwara, where Marathi is the chief language spoken, is covered by the Deccan Lavas and so is part of the great Deccan Lavas Region or the Black Cotton Soil Region. It is a land of flat topped hills, like those shown in Fig. 45. The world famous caves of Ellora are cut in beds of lava on the face of one of the escarpments, whilst the still more wonderful Ajanta Caves (shown in Fig. 6) are in a similar position in a gorge. This western half of the country is a dry zone; it grows huge quantities of cotton and the staple food of the people is millet with wheat also.

The eastern half of Hyderabad, known as Telingana where Telugu is the chief language spoken, is part of the Deccan Plateau, like that of Mysore only at lower elevation. There are wide stretches of rolling land with thin reddish soils, with rocky barren granite hills,

often just fantastic masses of boulders like that shown in Fig. 13.

The black soils of Marathwara hold moisture but are difficult to plough and two or three pairs of bullocks are used to pull the ploughs. Telingana with its light sandy soils needs irrigation from tanks, for the rivers dry up in the hot weather. Rice is grown under irrigation; the other main crop is millet (jowar).

The two great river systems are the Godavari—held sacred by vast masses of people—in the north and the Kistna in the south.

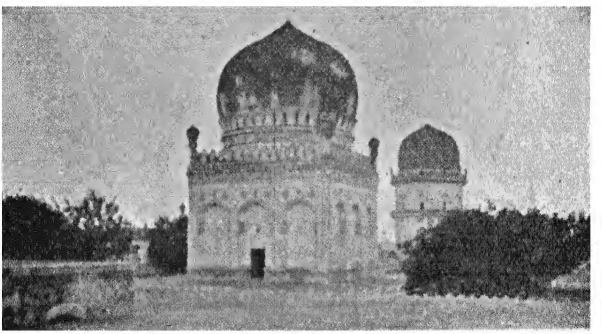
Amongst the tanks of the Telingana region some are very ancient. Of the more modern ones Osmansagar near the capital was constructed to obviate the disastrous flooding of the Musi River and to supply the capital with drinking water, whilst Himayatsagar nearby is for irrigation. Much larger is Nizamsagar recently formed by damming the river Manjira by an embankment two miles long and capable of irrigating nearly 300,000 acres. Sugar-cane is to be grown extensively in this area. In some cases no less than five harvests will be possible.

**Minerals and Industries.**—Hyderabad has coal deposits in troughs amongst the ancient rocks and coal is worked at Singareni, Sasti and Paoni. The old rocks have mica, corundum and garnets, but the once important gold and diamonds are no longer worked. Limestone is quarried near Gulbarga for the manufacture of Shahabad cement and marble is worked at Warangal.

In connection with the growing of cotton there are ginning factories in many places (see Fig. 188) as well as several spinning and weaving mills. Hyderabad produces one-fifth of the cotton of India and efforts

are being made to use more of this in home factories. In addition such old industries as the silks of Sangareddi, the cloth of gold of Aurangabad and the carpets of Warangal are being encouraged.

Hyderabad has an important production of oil seeds, including 60 per cent of the world's supply of castor oil seeds. There is a soap-making industry in Hyderabad.

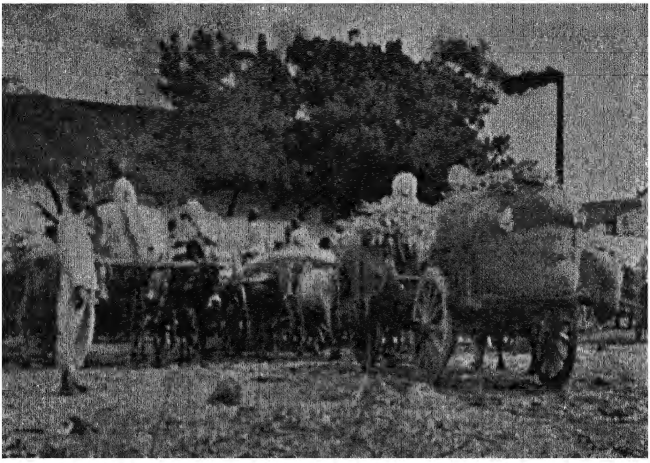


[*Photo* : *L. D. Stamp*

**Fig. 187. Tombs near Hyderabad City**

**People and Towns.**—Owing to its central position Hyderabad has been a meeting place of races, languages, religions and cultures. Although Marathi and Telugu are the two chief vernaculars, many educated people speak Urdu and this is the language used in the great Osmania University in Hyderabad—founded in 1918 and now being endowed with magnificent buildings.

The city of Hyderabad, with its suburb Secunderabad, is the fourth largest city of India. It is the centre of the Government and of the railway system and is



[*Photo*: *L. D. Stamp*

**Fig. 188. Carts bringing cotton to a local cotton ginnery (near Ajanta Caves, Hyderabad)**

a growing manufacturing centre—with soap, cigarette and button factories. Hyderabad can be reached by broad gauge railway from Bombay to Madras, but the main railway system of the State is narrow gauge. Thus narrow gauge lines run to Aurangabad, the chief centre of the north, and Warangal to the east. The other main centres, Gulbarga and Raichur are both on the main broad gauge line. The State Railways have also developed an important motor-bus service—running over nearly 4,000 miles of metalled road.

# CHAPTER XXXIII

## THE CENTRAL PROVINCES, INCLUDING BERAR

### I. THE PROVINCE

The Central Provinces and Berar occupy a large area in the heart of India. The Central Provinces are larger than the United Provinces, but have only one-third as many people. They are nearly as large as Madras, but have less than half as many people. On the whole, the Central Provinces are not so well developed as most of the British Provinces in India, largely because the country is not so suited for development. A number of small Indian states are included.

The country is very varied. Running through the north of the Central Provinces is the great line of highlands which divide Peninsular from Northern India—the Satpura Line. In the Central Provinces the highlands are known as the Mahadeo Hills and the Maikal Range and pass eastwards into the Chota Nagpur Plateau. North of this line the country belongs to the Central Indian Foreland. Berar, forming part of the great cotton growing region of the Deccan Lavas, described under Bombay, lies south of this line. The flat land round Nagpur forms part of the Godavari Valley. Around Raipur is another plain, the Chhattisgarh Plain, or Valley of the Mahanadi, whilst in the south are the wild hill regions of the Eastern Ghats (now included partly in the Province of Orissa).

*Berar* is the most developed region on account of its rich cotton soil. It forms part of the Deccan

Lavas Region, described under Bombay. Akola and Amraoti are the collecting centres from which the cotton is sent by rail to Bombay. Berar belongs to the Nizam of Hyderabad, but is administered with the

**Fig. 189. The north-east of the Indian Plateau**

Land over 500 feet, light dots; land over 1,500 feet, dark dots; land over 3,000 feet, black. The railway between Raipur and Vizagapatam is now complete.

Central Provinces, the Indian Government paying a rent to the Nizam.

If we consider together the whole of the north-eastern part of the Plateau of Peninsular India—the eastern half of the Central Provinces, with the adjoining parts of Hyderabad, Madras, Bihar and Orissa and

Central India—we see that it was once a high plateau of old hard rocks but for a very long time its surface has been worn away by great rivers like the Mahanadi and Godavari. Now we find pieces of the old plateau separated by broad valleys. Some parts are, then, very different from others, but let us just see what features are common to all parts.

(*a*) It is still a plateau since nearly the whole is more than 500 feet above sea-level and is bounded on the south-east by the Eastern Ghats—where the rivers cut through the Eastern Ghats they form rapids.

(*b*) It consists of old hard rocks.

(*c*) It has a rainfall of more than 40 inches over the whole and so is wetter than the other regions of the great plateau of Peninsular India.

**Sub-Regions.**—Now study Fig. 189 very carefully and see the reasons for dividing the North-eastern Plateau into smaller regions. These divisions are:—

(*a*) The Chota Nagpur Plateau (Bihar and Orissa).

(*b*) The Central Plateau or Central Highlands (Central Provinces).

(*c*) The Eastern Ghats (partly in the Central Provinces, partly in Orissa and Madras).

(*d*) The Chhattisgarh Plain or Mahanadi Valley (mainly in the Central Provinces, partly in Orissa).

(*e*) The Godavari Valley (partly in the Central Provinces, partly in Hyderabad).

## II. THE CENTRAL PLATEAU OR CENTRAL HIGHLANDS

The Central Plateau is very like the Chota Nagpur Plateau but is not quite so wild. At the western end it joins the Satpura Range and at the eastern end the Chota Nagpur Plateau and the whole line of mountains

and uplands forms the very important barrier across India about which you learnt in Chapter II. To the south lies Peninsular India, to the north lies Northern India. The regions to the north are connected with the Plains of Northern India rather than with the Plateau of Peninsular India. To the north of the Central Plateau is the narrow Narbada Valley in which the very important town of Jubbulpore is situated. Jubbulpore is the gateway to the north.

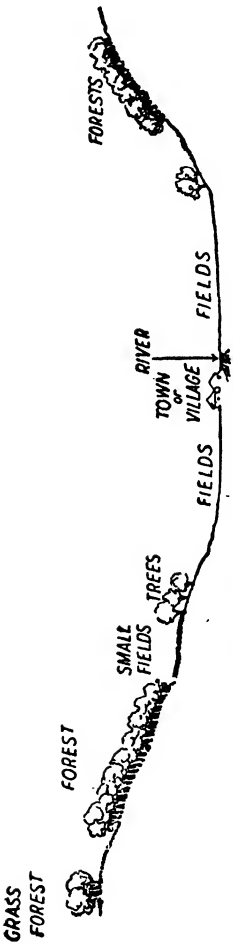



Fig. 190. Typical Valley Section

## III. THE EASTERN GHATS

Like the Chota Nagpur Plateau this is a wild region inhabited by wild forest tribes and the ordinary law of the land is only partly in force. The chief government officials are called 'Agents'. That is why we talk about the 'Agency Division'. The division is more hilly than Chota Nagpur and some peaks are nearly 5,000 feet high. The hill tribes speak curious languages of their own. Very few of them can read or write, because they often have no schools and no books. They have to struggle so hard to get a living from the jungle that they have very little time to

spare for improvement. Their clothes are few and dirty. They have wild religions of their own and are not Hindus or Muslims. They are brave men but their life is very hard. From early morning till dark, almost every day of the year, they have to work clearing a small patch of forest round their villages and growing enough food to live. The forests are again mostly sal but there is a little teak in the south.

## IV. THE CHHATTISGARH PLAIN

The Chhattisgarh Plain or the Mahanadi Valley is a broad valley separating the Plateau of Chota Nagpur and the Central Highlands from the Eastern Ghats. It is a rice-growing district with about 150 people to the square mile. Compare this with 60 people to the square mile in the Chota Nagpur Plateau.

The most important centre of this part is *Raipur*, and there are railways running from Raipur in several directions. An important new railway has been constructed between Raipur and Vizagapatam, where new harbour works were opened in 1933. A large area of land round Raipur is irrigated.

## V. THE GODAVARI VALLEY

The Godavari Valley is rather like the last region but in many parts the valley is narrow. Where it cuts through the Eastern Ghats there are dangerous rapids. The river is navigable for at least part of the year but there is one stretch near Seoni which cannot be used and a tramway has been built to cut off a bend of the river. Find this in Fig. 189. In the Godavari Valley there are sedimentary rocks. In the sandstones of the Godavari Valley coal has been found and one day there may be an important coalfield here.

## VI. TOWNS OF THE CENTRAL PROVINCES

The Central Plateau is crossed by several railways where it is narrow. We have already talked about the Narbada Valley to the north of the Central Plateau. There is the big city of *Jubbulpore,* the gateway to the fertile Ganges Plain. Study its position carefully. It has more than 100,000 inhabitants.

In the Chhattisgarh Plain notice how the railways radiate outwards and follow the easiest routes through the surrounding hills. *Nagpur* is situated on the borders of the Deccan Lavas Region.

Before we leave this natural region there is one interesting thing you should notice. In this and in many other natural regions there are some parts where crops are grown, other parts are covered with grass. Often if we take a section across a broad valley to the hills or plateaus on either side we find something like is shown in Fig. 190.

Notice the flat land with rice or other crops in the bottom of the valley near the river and the towns on the river; then smaller fields and some waste land, then as we climb the sides of the hills we pass into forests. Often when we have climbed on the flat surface of the plateaus we find grass pasture lands. We can call this a typical valley section.

### QUESTIONS AND EXERCISES

1. Do you think the Chota Nagpur Plateau will ever become an important part of India? Give your reasons fully.
2. Describe the agriculture in the hilly parts of this natural region.
3. Draw a sketch-map to show the important position of Nagpur.
4. If Vizagapatam is made an important port will it make any difference to this natural region?
5. Draw sketch-maps to show the importance of the position of Jubbulpore and Raipur.
6. Draw a map of Peninsular India showing the staple food of the people in different parts.

# CHAPTER XXXIV

## RAJPUTANA AND AJMER-MERWARA

### I. THE STATES OF RAJPUTANA

Rajputana is a large federation of Indian states in the north-west of India, south of the Plains. In the centre lies the small Province of Ajmer-Merwara. Running through the centre of Rajputana from south-west to north-east is the Aravalli Range. North-west of this range the country is very dry and slopes down gradually towards the Indus Valley and the Punjab Plains. This sloping area forms the Thar or Great Indian Desert. South-east of the Aravalli Range there is an upland country which may be called the Rajput Upland.

### II. THE THAR DESERT[1]

Northern India is separated from Peninsular India by a long line of hills running from west to east. In the west it is called the Satpura Range, passing eastwards into the Mahadeo Hills and then the Maikal Range. Throughout the history of India this line has formed a very important barrier and has cut off the peoples of Northern India from those of Peninsular India. The part of India lying north of the range slopes, on the whole, towards the great plains of the Indus and Ganges. There are however lines of hills which interrupt the general slope. The two most

[1] Comprising roughly the North-Western part of Rajputana and the adjoining tracts of Sind and the Punjab.

important lines are the Vindhya Range and the Aravalli Range.

Notice now the position and direction of the Aravalli Hills—from south-west to north-east through the heart of Rajputana. The crest of the range is generally about 3,000 feet high, and from there the land slopes north-westwards, gently but irregularly, to the plains of the Indus. The Great Indian Desert occupies this sloping area. The Thar or Great Indian Desert may thus be defined as a vast dry area lying between the slopes of the Aravalli Range and the Indus Plains.

It consists of a sandy waste, interrupted by rocky hills and waterless valleys. The ground is often entirely bare, in some places there may be a few shrubs or plants with thick fleshy leaves and stems which can store up water or with very long roots which can reach the moisture far below the surface.

The rainfall of the Desert is generally less than 10 inches annually. Even this amount is very irregular and falls mainly during storms. In some years there may be no rain at all. Notice, however, that the rainfall is greater than in parts of the rich Indus Valley. The Thar Desert remains a desert because there are no large rivers which can be used for irrigation. Even if rivers existed, the land is not flat and it is difficult to irrigate land unless it is flat.

Very few people live in this region. In the State of Jaisalmer, which lies in the centre, there are only four people in every square mile. Some of the people live in villages which spring up where there is a little water and a little millet and fodder can be grown. Often the water in the wells fails or becomes salt and the village has to be abandoned. Many people own camels and trade across the desert.

The railway from Karachi to Delhi runs along the

southern border of the desert, and another railway cuts across the eastern end, but there is no railway or

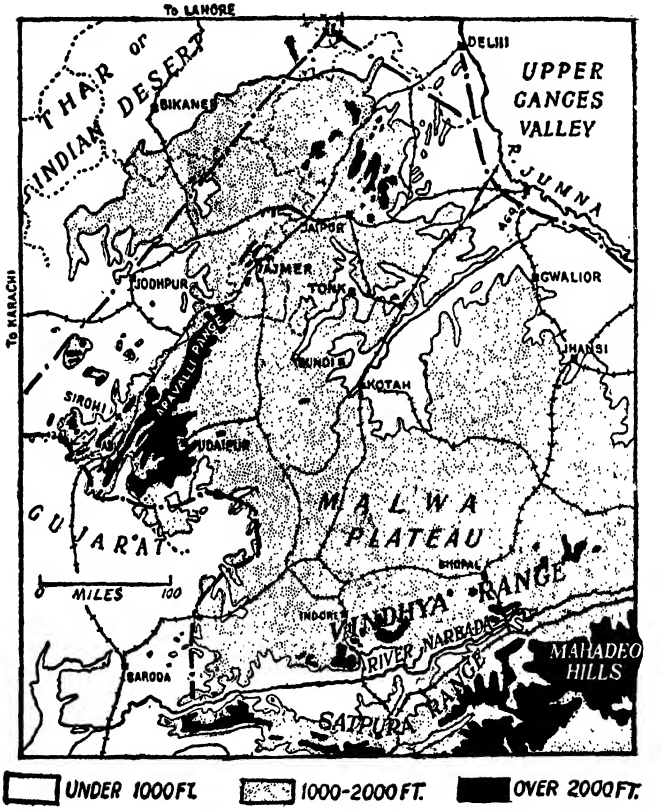



Fig. 191. The Rajput Upland Region

road through the heart of the desert. It is still a great barrier to the movement of man as it has been throughout Indian history. It can be crossed by

camel routes and one of the principal centres is the little town of Jaisalmer. Bikaner is a small town towards the eastern end of the desert and noted for its manufacture of camel hair goods. Many carpets are made here. It is a flourishing city and increasing in size.

## III. THE RAJPUT UPLAND REGION[1]

1. **General Features.**—In the last section it was explained that Northern India is cut off from Peninsular India by the Satpura line of mountains. From the north of that line, up to and including the Aravalli Range there is a large tract of upland country, hilly, mountainous or plateau. The northern half of the tract is occupied by the group of Indian states known as Rajputana, the language spoken is Rajasthani. Old, hard, crystalline rocks occupy this part. Further south we find the old hard rocks have been covered by great flows of lava known as the Deccan Lavas. This southern half of the tract is occupied by the group of Indian states grouped as Central India (west). It is not always easy to decide into what natural regions a country should be divided, and here is an interesting case. The rocks and soil of this southern part are like those of the Deccan Lavas Region of Peninsular India, and so we can treat this southern area as part of the Deccan Lavas Region. But the Satpura Line is an important barrier and general considerations link this southern part with Rajputana.

Look again at the map and at the map of India in your atlas and notice that the Rajput Upland Region consists of:—

(*a*) The Aravalli Range.

[1] The Rajput Upland Region comprises the whole of the south-eastern two-thirds of Rajputana—with both slopes of the Aravalli Range, the Province of Ajmer-Merwara and part of Central India (western division).

(*b*) The network of forested hills of southern Rajputana.

(*c*) The Valleys of Eastern Rajputana.

(*d*) The Vindhya Hills and their northern slopes with the Malwa Plateau.

(*e*) The Narbada Valley.

2. **Climate.**—The whole region receives less than 40 inches of rain. In the north-west the slopes of the Aravalli Range fade away into the Thar Desert. To the east the rainfall gradually increases and the region passes gradually into the Central Indian Foreland with more than forty inches. The Rajput Upland is, then, a dry region. It is also a hilly region and so irrigation is difficult. We find that crops depend mainly on rainfall. In good rainfall years the crops

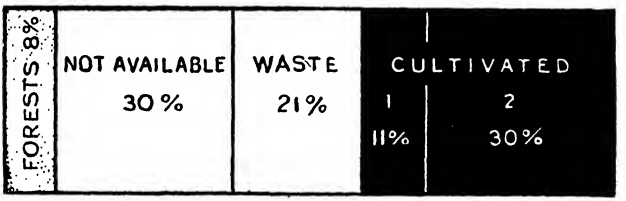



**Fig. 192. Cultivated Land, Rajput Uplands**

are good; in bad rainfall years the crops may fail entirely. There are two harvests, the Rabi and Kharif. Sometimes one may be bad and the other good. When both are bad, severe famine may result. The rain falls mainly during heavy storms and the amount always varies greatly from year to year.

As a result of the irregular rainfall, not many people live in this natural region. In good years a great many more people could easily live here but in bad years even the few people there are have to get food from other regions.

3. **Crops.**—Although the rainfall is only just enough

for the growth of forests, the hills of Southern Rajputana—the home of the Bhils—are forest-covered. Fig. 192 shows the large proportion of waste land. The staple food of the people is millet, and gram for fodder. Study Fig. 193

In the hilly forested parts of this region live the Bhils, a wild forest tribe. In other parts of the region the people are mainly Hindus and Rajasthani is their language. Rajputana is the great centre of the Jains. If we look at the occupations of the people we find far more are engaged in industry than in many other parts of India. That is because there are important native industries—especially the making of cotton goods at Bikaner. Woollen goods, especially

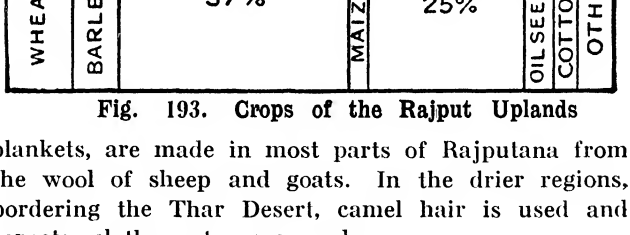



**Fig. 193. Crops of the Rajput Uplands**

blankets, are made in most parts of Rajputana from the wool of sheep and goats. In the drier regions, bordering the Thar Desert, camel hair is used and carpets, clothes, etc., are made.

4. **Towns.**—This region lies between the fertile plains of the Upper Ganges and the regions of Peninsular India. So we find, although it is not very important or thickly peopled there are several important railway lines running right through it. Along the northern edge, that is along the northern slopes of the Aravalli Range, is the line from Karachi to Delhi; further south is the line from Delhi to Bombay. To the east of the region is the line from Agra,

through Jhansi to Bhopal and then joining the line along the Narbada Valley. The Narbada Valley is an important highway. Along it runs the railways from Bombay to Jubbulpore and on to Allahabad and Calcutta.

*Ajmer,* the principal town of the Province of Ajmer-Merwara, is an important town of over 100,000 inhabitants. It is a flourishing city and steadily increasing in size and has food and textile industries and railway workshops.

*Jaipur* is larger than Ajmer but is getting smaller. It has suffered much from plague and other diseases. It has textile and railway industries.

*Mount Abu* is a small hill station at the southern end of the Aravalli Range. It is 5,000 feet above sea-level and has a rainfall of 60 inches although the plains nearby have only 20 inches.

*Jodhpur* is on the borders of this region and the desert.

*Udaipur* is the beautiful capital of the proud state of Mewar which has an area of 12,750 square miles and a population of 13·5 lakhs. The state occupies a hilly plateau at the southern end of the Aravallis.

Other cities in Rajputana owe their importance usually to their being capitals of States. They are not flourishing and tend to decrease in size.

### QUESTIONS AND EXERCISES

1. Draw a sketch-map of Northern India to show the lines of hills which separate Northern from Peninsular India.

2. Write an account of the climate of the Rajput Upland Region and its influence on agriculture.

3. Who are the Bhils? Describe their life and draw a little map to show where they live.

4. Draw a sketch-map of this natural region marking the parts into which it may be divided.

# CHAPTER XXXV

## THE CENTRAL INDIA AGENCY AND GWALIOR

### I. THE STATES

The Central India Agency is a federation of Indian states lying as the name implies, in Central India. The most important is Gwalior. The states form two blocks of country, separated by a portion of the United Provinces. The western half lies in the Rajput Upland Region; the eastern half lies in the Central Indian Foreland.

In the western half Indore is the largest town and is an industrial centre. Bhopal has few industries and is growing but slowly. Lashkar and Ujjain have cotton factories. The town of Gwalior is on the borders of the Ganges Valley.

### II. THE CENTRAL INDIAN FORELAND [1]

In Chapter XXXIII it was explained that Northern India is cut off from Peninsular India by a line of mountains and highlands, the Satpura Range, Mahadeo Hills and Maikal Range. Between this line of mountains and the great Plain of Hindustan—the valleys of the Indus and Ganges—the land forms an irregular plateau, sloping on the whole northwards. The western part we have now described as the Rajput Upland Region; the eastern part we may call the

[1] The whole of this natural region comprises a strip along the southern border of the United Provinces, with Jhansi and the eastern part of the Central India Agency and the northern part of the Central Provinces.

Central Indian Foreland since it is the land which lies *before* the mountains of the centre of India—of the Central Provinces. The most typical part of this natural region is found in the areas known as Bundelkhand and Baghelkhand.

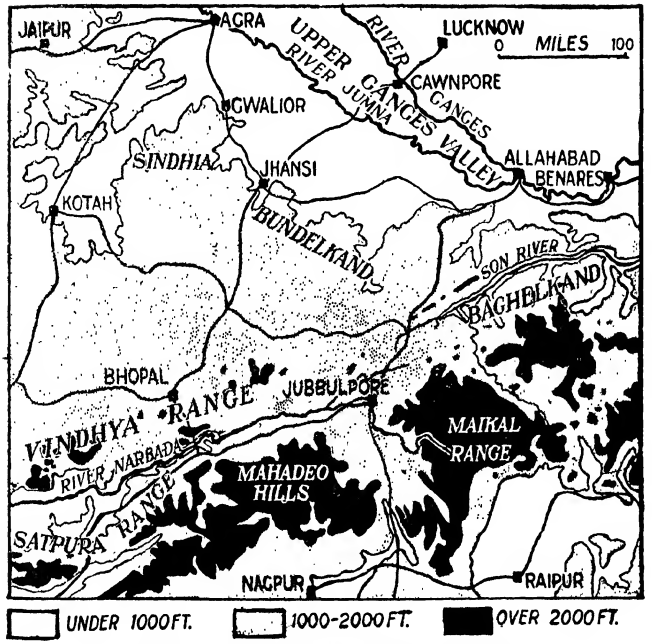



**Fig. 194. The Central Indian Foreland**

The chief difference between this region and the Rajput Upland Region is that most of this region has a rainfall of more than 40 inches. In the Rajput Upland Region wheat and millet are the two staple crops, in this region rice is the most important. The Rajput Upland lies between the Satpura Range and

the Thar Desert. The Central Indian Foreland lies between the highlands of the Central Provinces and the Ganges Plain, nearly as far north as the Jumna River. The northern strip of this region, along the Jumna River, has slightly less than 40 inches of rain and is irrigated by canals which, however, dry up in the hot season.

This region is thinly populated and has only about 120 people to the square mile.

*Jubbulpore*, lying in the Central Provinces is by far the most important town. It owes its importance mainly to its position. Notice that it lies in the upper part of the Narbada Valley near which there are easy ways across the great Ganges Plain to the north and to the Chhattisgarh Plains around Nagpur on the south. One of the main railways from Bombay to Calcutta takes advantage of these natural features, runs up the Narbada Valley as far as Jubbulpore and then crosses to the Ganges Valley to Allahabad. Jubbulpore also has important cotton manufactures. *Jhansi* in the United Provinces is a collecting station in the north-west of the region and is now a railway junction.

# CHAPTER XXXVI

## COMMUNICATIONS IN INDIA

1. **Transport.**—When goods have to be sent from one place to another, several things must be considered: (*a*) the cost of the journey; (*b*) speed or time; (*c*) whether the goods will suffer damage on the way. Generally speaking, the cost of the journey is by far the most important consideration. The only cost which has to be thought of if things are sent by river, is the wages of the crew and the original cost of the boat (unless a steamer is used). In the case of a railway, the cost is very much more, because a railway costs a very great deal of money to build, and, in addition, there is the cost of the trucks and engines, the coal or wood which is burnt, and the wages of men employed on the line. If goods are sent by road, there is not only the wages of the man who drives the bullocks or horses, but also the cost of the animals' food. A horse can pull about one ton of goods along an ordinary road, but he can drag a boat laden with forty tons of goods along a canal. If the time taken on the journey does not matter, the transport by water is usually the cheapest, but can only be used where Nature has provided suitable rivers or waterways. Man can construct canals, but not in hilly country, and canals cost much money to build and maintain. When it is important that goods should travel quickly, then the railway becomes the most important. Moreover, railways can be constructed exactly where man wants them to go. Since motor cars have become

common, transport by road has become much quicker and is very important for short journeys.

2. **Rivers and Canals.**—India is plentifully supplied with rivers, but owing to the fact that the rivers of Peninsular India are nearly dry in the hot weather and the water of the northern rivers is used for irrigation, river transport is not now very important. All the rivers of India are much more important now for their water, which can be used in irrigation. The irrigation canals are very little used for transport. In England and other parts of Europe the canals are used entirely for transport. There are now a number of good roads, but the most important means of communication in India are the railways. Railways have now replaced all other means of communication to a very large extent. This is particularly the case in the Ganges Valley where there is a great network of railways. In Peninsular India the land is not so highly developed as it is in the plains of Northern India and there are not yet so many railways.

Let us take first the water routes of Peninsular India. There is an important water route along the West Coast from the north of Malabar to Travancore, the vessels making their way through a series of natural lagoons, aided by a few artificial cuts or canals. This is important because there is no railway running right along the West Coast and a sea journey from one part of the coast to another is dangerous owing to the poor harbours and the force of the monsoon (see Chapter XXVII). In the deltas of the big rivers such as the Cauvery, Kistna, Godavari and Mahanadi boats are much used both on the creeks and the irrigation canals—there are few roads and few railways. The vessels are of all kinds and sizes; from large round wicker baskets used on some

rivers of Madras to large flat-bottomed boats which carry salt. An important canal, called the Buckingham Canal, connects Madras with the canal system of the Kistna River and also runs sixty miles south from Madras. It is a salt water canal and runs close to the sea. Often there is only a line of sand dunes between the canal and the sea. It is important because of the dangers to boats going up and down the coast. Some of the rivers, especially the short ones of the West Coast, are important because they can be used for floating logs of timber from the forests to the coast town. Timber reaches Calicut in this way.

3. **Roads.**—Roads are of two kinds, 'metalled' and 'unmetalled'. You have probably seen a road being repaired and have watched the workmen spreading broken stones on the surface and then sand; finally a heavy steam roller crushes the whole surface flat and makes it smooth. A road made in this way is a 'metalled' road, so called because the name given to the broken stone used is 'road metal'. You have seen also the rough roads between villages, dusty in the hot weather but thick with mud or even covered with water in the rains. No 'road metal' is used for these roads and they are thus termed 'unmetalled'. Metalled roads are expensive to build and maintain, but every year more are made in India. Some are kept in repair by the Public Works Department of the Government (P.W.D.), others by District Boards. Most of the metalled roads now have their surface covered with tar. This is expensive but makes them last longer because dust does not blow from their surfaces and rain does not wash away the finer particles. Another modern method of road-making which is very good is to make the roads of concrete. One

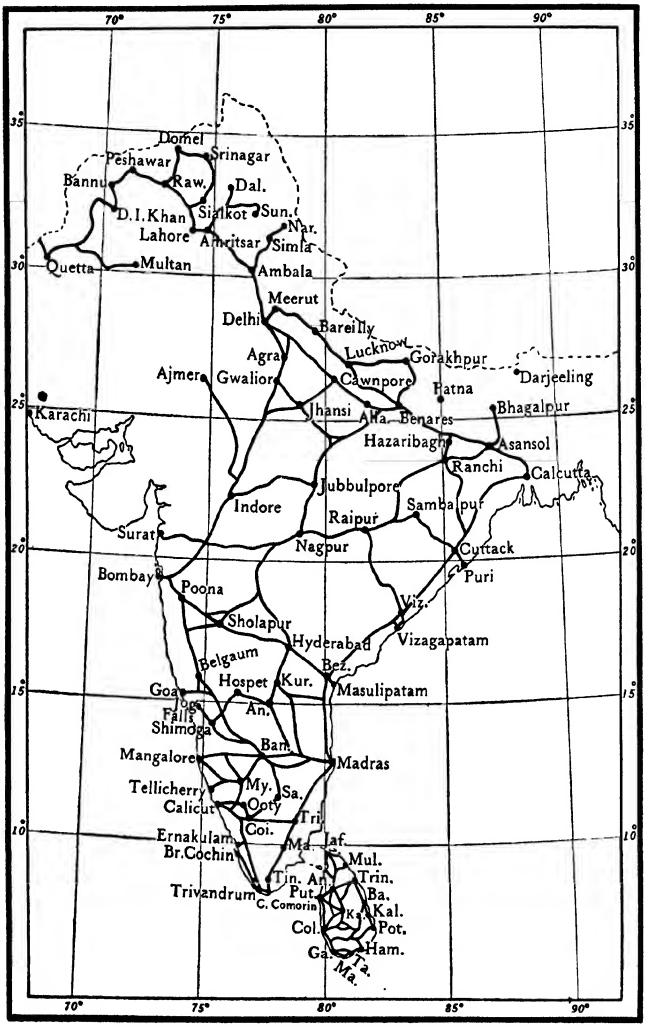



**Fig. 195. The chief main roads of India**

of the most famous roads of India is the Grand Trunk Road which runs from Calcutta, through Delhi to Peshawar. It was commenced in 1828, before railways had become common, and was completed in

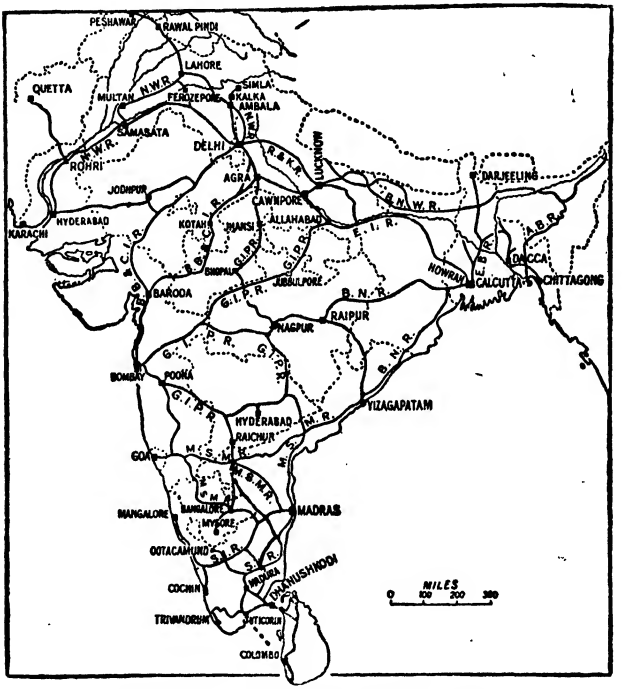



**Fig. 196. Railway map of India**

Scale: 530 miles to 1 inch.

1863-64. A loop road runs from Ludhiana through Ferozepore to Lahore.

There are three very important roads from Madras. One is the road to Calcutta, the second is the road

to Calicut on the West Coast, the third the road to the frontier of Travancore. These roads were made before the days of railways and were then the only means of communication and so much more important than they are now. There are several important hill roads. One runs from the plains to Darjeeling,

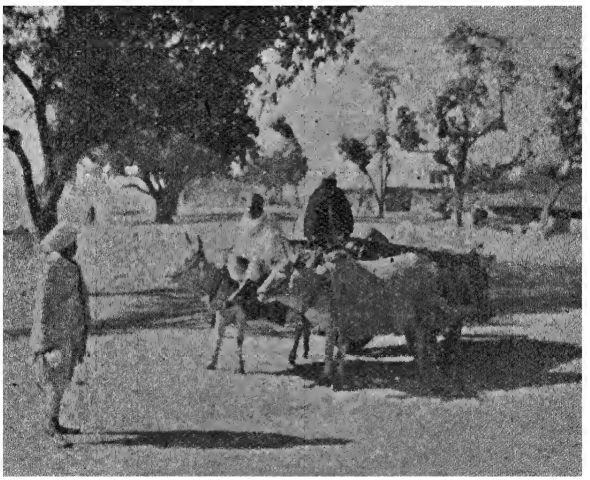


Fig. 197. Road transport—old style

A bullock cart in the United Provinces.

another to Mussoorie, another from Ambala through Kalka to Simla. But the Simla Road is continued to the Shipki Pass on the borders of Tibet. Another mountain road runs from Rawalpindi to Murree and Srinagar. The North-West Frontier Province is also served by some good roads, so that the frontier can be easily reached in time of trouble.

Gradually all the important towns of India are being linked by road and on all the roads we find motor-buses.

Bullock carts are the chief means of transport on the unmetalled roads. There are numerous 'unmetalled' roads between villages all over India, except in the Deltas and very wet lands of the West Coast.

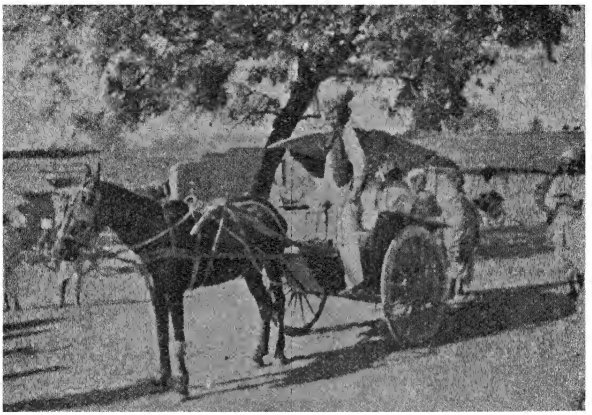


Fig. 198. Road transport—old style

A pony cart in the United Provinces.

As their surface is not hard, it quickly becomes full of ruts and the 'roads' become difficult even for bullock carts. The 'roads' in the hilly regions are often mere tracks, wide enough only for pack mules. It is sometimes more difficult to construct a metalled road in the plains than in the hills, for the stone has to be brought from considerable distances and great care is required to get a good foundation. But building a mountain road is very costly because of the many

bends, cuttings and bridges. Portions of the hills may need to be cut away before the road can be built. It is fortunate that in the Punjab and Upper Ganges Valley concretions called 'Kankar' occur in the alluvium and can be used on the roads. It is no use piling broken stone on a soft stretch of paddy land. A metalled road must have a good foundation first.

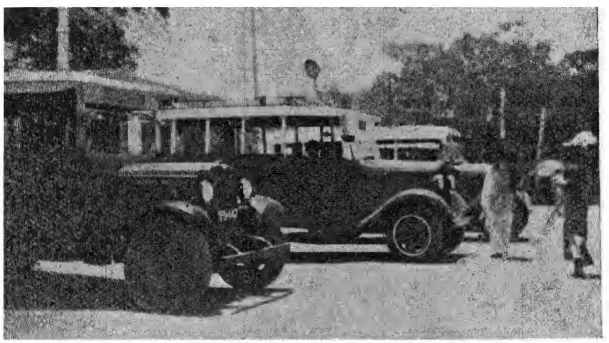


**Fig. 199. Road transport—new style**

4. **Railways.**—The most important means of communication are the railways. You all know that railway trains run on 'lines'. Perhaps you have noticed if you have been far in India that all the railway engines and carriages are not of the same size. The most important thing of all in size is the distance between the two railway lines. If the lines are close together we can only have small engines and small carriages and travel slowly. If the two lines are far apart, the engine and carriages can be much larger

and can travel much more quickly. The distance between the two rails is called the 'gauge'.

In India there are two very important gauges, and two others much less important. The important ones are:—

(*a*) *The Broad Gauge.*—The two lines or rails are 5′ 6″ apart and the engines are big and heavy and the trains can travel very quickly. But the broad gauge railway is very expensive to build and the trains cost a lot of money to run.

(*b*) *The Metre Gauge.*—The two lines or rails are one metre, or 3′ 3⅜″ apart. The engines are smaller and the trains are smaller and do not travel so quickly but they are less expensive to run. The metre gauge railway is less expensive to build and it has another advantage, the lines can be made to go round much sharper bends and curves than the broad gauge railway.

There are two smaller gauges, 2′ 6″ and 2′ which are used for local railways and hill railways.

There are over 41,000 miles of railway in India. Nearly half is broad gauge and rather less, metre gauge. You should remember that in Europe and a great part of America quite a different gauge is used —called the standard gauge. The rails are 4′ 8½″ apart.

Many of the railways in India have only single tracks and trains can only pass each other at stations where the track is made double.

Most of the railways from Calcutta, Bombay, Madras and Karachi have double tracks on their main lines, some even have four tracks.

5. **Ports.**—You will learn in the next chapter that the whole of the great area we have been studying in this book has six main ports—six outlets to the sea

through which goods can be exported and other goods received in exchange. One of these ports, Colombo serves the island of Ceylon, another (Rangoon) serves Burma, two serve Peninsular India (Bombay and Madras), one (Calcutta) is the outlet for North-eastern India, while the products of North-western India pass mainly through Karachi. These ports are of the greatest value to India and it will be easiest to study the railways of India by taking each port in turn and seeing what railway lines serve it.

6. **Bombay.**—Let us take the railways which start from the great port of Bombay and run to all parts of its hinterland. There are four great main lines: —

(*a*) One running north to Baroda and the Capital of India—Delhi, connecting there with the railways into the Punjab and the north-west of India. This is the Bombay-Baroda and Central India Railway.

(*b*) One running north-eastwards, passing through the Thal Ghat Pass in the Western Ghats, into the Central Provinces to the town of Jubbulpore and thence to Allahabad. This is the Great Indian Peninsular Railway. At Allahabad it joins the East Indian Railway which runs on down the Ganges Valley to Calcutta and so this is one of the direct routes from Bombay to Calcutta and is followed by the trains which carry the mails from Bombay to Calcutta. Remember that Calcutta is east of the Hooghly River and all trains stop at Howrah Station to the west of the river (see Fig. 200).

(*c*) There is also another line which at first is the same as the last, but when it enters the Central Provinces runs directly eastwards to Nagpur. This is also a main line of the great Indian Peninsular Railway. At Nagpur it joins the Bengal-Nagpur Railway and runs on to Howrah. It forms a shorter route from

Bombay to Calcutta than the last, but it has to cross numerous valleys which cut up the Plateau of Peninsular India and so the trains cannot travel so rapidly as they do on the flat plain from Allahabad.

(*d*) The fourth route runs south-eastwards from Bombay, through the Bhor Ghat gap in the Western Ghats, past the town of Poona, through the State of Hyderabad to Madras. This is also part of the Great Indian Peninsular Railway as far as Raichur, where it joins the Madras and Southern Mahratta Railway.

All these railways are broad gauge lines.

7. **Madras.**—Now let us look at the railways which run from the city of Madras. Again there are four principal lines.

(*a*) One runs northwards and then north-eastwards from Madras, following the coast. This is the broad gauge Madras and Southern Mahratta Railway. It crosses the Rivers Kistna and Godavari by two magnificent bridges and runs as far as Waltair (near Vizagapatam) where it joins the Bengal-Nagpur Railway and continues to Calcutta (Howrah).

(*b*) The other main line of the M. and S. M. Railway runs north-westwards to Raichur and joins the G.I.P. Railway forming the direct route to Bombay. We have already mentioned this route.

(*c*) Running westwards from Madras are the broad gauge main line of the M. and S. M. Railway and the South Indian Railway. It passes through the Palghat Gap between the Nilgiri Hills and Cardamom Mountains and so reaches the West Coast, where it runs northwards as far as Mangalore. There is a branch to near Cochin.

(*d*) Running southwards from Madras there is another main line of the South Indian Railway, but it is a metre gauge line. It passes through Trichinopoly

to Tuticorin. More important now is the line from Trichinopoly to Pamban and Dhanushkodi Pier from whence a small steamer runs across the 22 miles of shallow strait to join the Ceylon Railways. This is the route now followed by the mails from Madras to Ceylon. There is another branch into Travancore, ending at Trivandrum.

There are, of course, many other railways in Peninsular India. An important metre gauge one runs to the port of Mormugao (Goa) on the West Coast. Study the others in your atlas. Notice how all the important railways follow the easiest routes from the plains to the plateau.

There is one interesting little railway, we may notice. That is the Nilgiri Mountain Railway which takes passengers and goods up to the hill station of Ootacamund in the Nilgiris. It is a very small railway and specially made so that the trains cannot slip backwards when they are going up the very steep parts.

8. **Calcutta.**—Until 1932 there was no permanent bridge across the River Hooghly at Calcutta, but only a 'pontoon' or bridge of boats. So Howrah grew up as the railway terminus for most of the railways. A magnificent new bridge has now been completed, carrying a road and railway line across the river. This is the Willingdon Bridge, but it is some miles north of Calcutta, so that Howrah still remains the terminus of the principal lines.

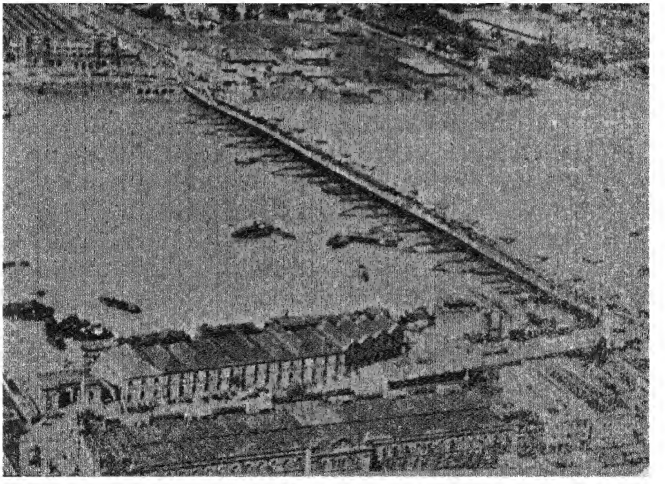
Starting from Calcutta and Howrah there are three very important lines: —

(*a*) The Eastern Bengal Railway serves nearly the whole of Bengal, except to the west and north-west of Calcutta. South of the River Ganges it is a broad gauge railway and there is now a fine bridge over the

River Ganges at Sara. The broad gauge line continues to Siliguri, the station for the mountain railway and motor road up to Darjeeling but north of the River Ganges nearly all the other lines are metre gauge lines. You will notice from the map how much this railway depends on steamers. The Eastern Bengal Railway is interrupted by rivers in at least five places. There is one piece of the railway called the Dacca Section which is quite cut off from the other parts. The river is too broad to be crossed by railway bridges: it must be crossed by ferry steamers which connect with the trains. Notice too that the Eastern Bengal Railway is a railway which includes both broad gauge and metre gauge. The engines and trains used on the broad gauge sections cannot of course be

**Fig. 200. The Howrah Bridge across the River Hooghly at Calcutta, seen from the air**

Howrah station ↓ Site for new bridge ↓ [*Photo: Indian Air Survey Co. Ltd.*



used on the metre gauge and passengers have to change from one train to another at all places where the gauge changes.

(*b*) The East Indian Railway provides the great line of communication between Calcutta (Howrah) and the rich Ganges Valley. It is a broad gauge railway and runs from Calcutta to Delhi and Ambala and there connects with the North-Western Railway and goes on to Lahore and Peshawar. Notice that it remains the whole time to the south of the River Ganges but connects with all the great towns—Bhagalpur, Patna, Benares, Allahabad, Cawnpore and Agra. The East Indian Railway also serves the coalfields of Western Bengal.

(*c*) The Bengal Nagpur Railway is another broad gauge railway. Its main line runs direct from Calcutta (Howrah) to Nagpur and from Nagpur the Great Indian Peninsular Railway runs direct to Bombay. The Great Indian Peninsular Railway is also a broad gauge railway, so trains run direct without any change, right across India from Bombay to Calcutta. A second main line of the Bengal Nagpur Railway runs through Orissa and right down the east coast of India and connects with the railway to Madras.

Now we must consider the network of railways which is found in the Ganges Plain, north of the River Ganges. In the Middle Ganges Valley Region—that is, in Northern Bihar and the eastern part of the United Provinces—is the Bengal and North-Western Railway with its great network of metre gauge lines connecting great towns like Gonda, Gorakhpur and Darbhanga with the river towns such as Allahabad, Benares, Patna and Bhagalpur. The Bengal and North-Western Railway collects the agricultural produce of this region.

In the United Provinces there are several different

railways which between them form a network covering the plain north of the River Ganges. The principal ones are the East Indian Railway (mostly broad gauge): the Rohilkhand and Kumaon Railway (metre gauge) and branches of the Bombay, Baroda and Central India Railway (metre gauge). Running through the Central Indian Plateau is the Great Indian Peninsular Railway, one of the greatest railways in all India. It has a very important line running from Bombay and Central India to Jhansi and then dividing into three branches, one of which terminates at Cawnpore, another at Allahabad and the third at Delhi (via Agra).

9. **Karachi.**—From Karachi the broad gauge line of the North-Western Railway runs to Hyderabad where it branches. One branch, the Jodhpur Railway (metre gauge), runs right across the Great Desert and into the Rajput Upland Region, through Jodhpur till it joins the main line of the Bombay-Baroda and Central India Railway from Bombay to Delhi. There is a junction just before Jodhpur from which passengers can go direct to Bombay. This railway across the desert connects Karachi with Delhi and Karachi with Bombay.

The other branch from Hyderabad follows the Indus Valley into the Punjab. At Rohri Junction a branch line crosses the Indus, passes by Sukkur and runs up through the Bolan Pass to Quetta in Baluchistan and on to the border of Afghanistan.

At Samasata Junction in the Punjab the main line from Karachi branches, one line crosses the Sutlej to Multan and Lahore, the other continues as the Southern Punjab Railway and curves round the north of the Indian Desert to Delhi.

Now let us look at the network of lines in the

North Punjab Plains. Delhi is directly connected with Calcutta by the East Indian Railway (E.I. R.) and with Bombay. From Delhi to Lahore there are two main routes.

(*a*) N. W. R. through Ferozepur.

(*b*) N. W. R. through Ambala.

From Ambala a line runs to Kalka in the foothills, where the hill railway to Simla starts.

From Lahore the main line runs to Peshawar, crossing the Jhelum at Jhelum and the Indus at Attock. There are important branches along the south of the Salt Range down the Indus Valley through Mianwali and across the Indus to Kohat and by ferry to Bannu. All these railways are part of the N.W.R. and most are broad gauge.

10. **Chittagong.**—The little port of Chittagong is served by the Assam-Bengal Railway. It is a metre gauge railway and runs from Chittagong through the fertile Surma Valley, across the Eastern Hills Region into the Brahmaputra Valley. Notice the branch which goes to Sylhet and notice too the important roads which serve as 'feeders' to this railway.

11. Now let us look at the Railway Time-tables and see what we can learn about the distances between places and the time it takes to travel between them. Follow these journeys on the map in your atlas. Suppose we wish to travel by express train from Calcutta to Madras on the broad gauge B.N. and M.S.M. Railways. We can leave Calcutta (Howrah Station) at five o'clock in the evening. When we wake up at seven next morning we are at Berhampore (375 miles); by half past one we reach Waltair (547 miles) (Vizagapatam). It is just getting dark when we cross the Godavari River by the fine bridge and we shall reach Madras on the next morning at eight, having travelled

1,030 miles in 39 hours or about 650 miles a day. Big ocean steamers only travel about 300 (the faster ones 400 and more) miles in one day.

Now let us make another journey—from Calcutta to Bombay again on a broad gauge railway. We can go two ways: one from Howrah to Nagpur by B.N.R. and then by G.I.P.R. and the other from Howrah to Allahabad (E.I.R.) and then by G.I.P.R. to Bombay via Jubbulpore. The first is 1,220 miles, the other is 1,350 miles, but both take about 36 hours or about 800 miles a day.

Let us now take the main line of a metre gauge railway, the South Indian Railway from Madras to Dhanushkodi Pier (for Ceylon). It is only 422 miles, but takes 19½ hours or only 500 miles a day. Most metre gauge railways are even slower.

12. In Chapter II you learnt that India is shut in on the north and east by the wall of mountains. Notice that no railway cuts through this wall. The terminus of the Assam-Bengal Railway is only about 160 miles from Myitkyina, the terminus of the Burma Railways. Yet to go from one place to another the easiest and quickest way would be to go to Calcutta, then by boat to Rangoon and then to Myitkyina by train—a journey of nearly 2,000 miles in all instead of 160 miles.

We find then, that the railways of North-Eastern India are limited (*a*) by mountains, (*b*) by broad rivers. You learnt in Chapter XXVII and Chapter XXIX that the railways follow the easiest routes from the plains on to the plateau.

13. **Airways.**—Regular services of aeroplanes, carrying passengers and mails, now connect the principal cities of India with Europe and England, and India lies on the through route from London to Australia.

The Imperial Airways and associated companies fly from London to Karachi, Delhi, Allahabad, Calcutta, Rangoon and Singapore. It takes only six days to reach Rangoon from London by aeroplane. Other services fly from Karachi to Bombay and Madras. Notice that Karachi is the junction of the three main routes; it is a very important 'air port'.

## QUESTIONS AND EXERCISES

1. How would a man travel from Bombay to Trivandrum (during the S.-W. Monsoon)? From Madras to Delhi? From Delhi to Dacca? From Darjeeling to Chittagong? Karachi to Peshawar? Why would he travel the way you suggest?

2. If on an average you can travel 600 miles a day by train, 200 miles a day by motor car, 50 by steamer and 15 by bullock cart, how long would it take you to reach the following places from Bombay and how would you go:—Ootacamund, Goa, Comorin and Mercara? Use an atlas for this question. Also from Calcutta to Manipur, Shillong, Srinagar.

3. Is there any reason for the direction followed by railways from Bombay?

4. Draw diagrams illustrating the importance of the position of Chittagong, Cawnpore, Allahabad, Sukkur, Waltair, Palghat Gap, Dhanushkodi Pier, Cochin, Poona, in connection with railways. Use your atlas for this.

5. What is meant by 'hinterland'? Draw a sketch-map of the hinterland of Madras and Tuticorin.

6. Explain the advantage of improving means of communication and illustrate your answer from what has happened in your own district.

7. Look at Fig. 196. The nearest way from Madras to Mangalore is through Mysore. Why does not the railway go that way?

8. Get an old copy of Newman's *Indian Bradshaw*. Look at the railway map and work out the journey from your own home to Bombay, Madras, Calcutta or any other place you would like to visit.

# CHAPTER XXXVII

## TRADE AND RELATIONS WITH THE EMPIRE

1. No civilized country produces everything which it requires. The cities of India would seem very strange now without any motor cars, or if we could not buy such things as machinery, glass, fine cotton goods and silks or boots and shoes. These things cannot all be made here, they have to be obtained from other countries. Now, nearly all countries can produce more of certain things than they require. Such surplus products can be sent to other countries in exchange. Products which one country sells or sends in exchange to another are called 'exports'; goods which the country buys or receives in exchange are the 'imports'.

It is very much better if the exchange of goods is between different countries of the British Empire, for those countries stood together in the Great War, and they stand together in peace, and it is by the exchange of goods that they can help one another. India's trade, as we shall see shortly, is mainly with other countries of the British Empire or Commonwealth of Nations.

2. **Ports.**—The tables published by Government tell us the share each province has in the foreign trade of India. Try to remember these important places.

| | | | | |
|---|---|---|---|---|
| Bengal | has one important port | ... | ... | Calcutta. |
| Bombay | ,, ,, | ... | ... | Bombay. |
| Sind | ,, ,, | ... | ... | Karachi. |
| Madras | has Madras, Cochin and several other smaller ports. | | | |
| Burma | has one important port | ... | ... | Rangoon. |
| Ceylon | ,, ,, | ... | ... | Colombo. |

Fig. 201 will help you to remember which are the most important ports in India.

Bombay and Calcutta are almost of equal importance. Next is Karachi, then Madras, then Cochin, Chittagong and Tuticorin. All the other ports in India are a long way behind. The trade of Colombo is about the same as that of Rangoon and each handles rather more than Karachi.

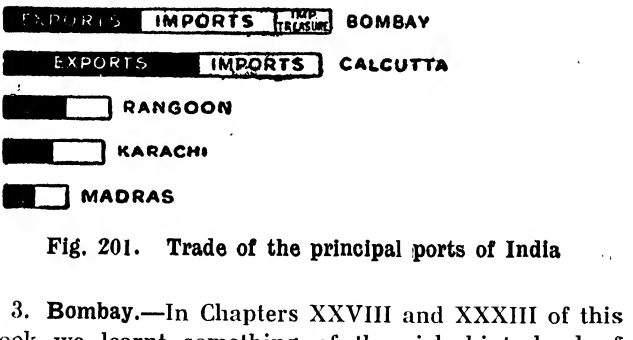



**Fig. 201. Trade of the principal ports of India**

3. **Bombay.**—In Chapters XXVIII and XXXIII of this book we learnt something of the rich hinterland of Bombay. Fig. 202 shows roughly the extent of the hinterland. Now let us see what things are produced in this rich hinterland and sent away to other countries. Fig 203 is a diagram showing their relative values.

*Cotton (raw).*—The raw cotton sent away from India every year to other countries is normally worth 20 to 30 crores of rupees. Nearly three-quarters of it is sent from the port of Bombay. Remember what you have learnt of the rich cotton-growing land of the Deccan Lavas Region and how the cotton is sent by railway through the two 'gaps' in the Western Ghats to Bombay.

*Cotton Manufactures.*—You remember that there are many cotton mills in Bombay and cotton is manufactured. But the value of the cotton goods sent away is only about one-fifth of that of the raw cotton.

*Cotton Seeds.*—These also form a valuable export. They are used for making oil in other countries.

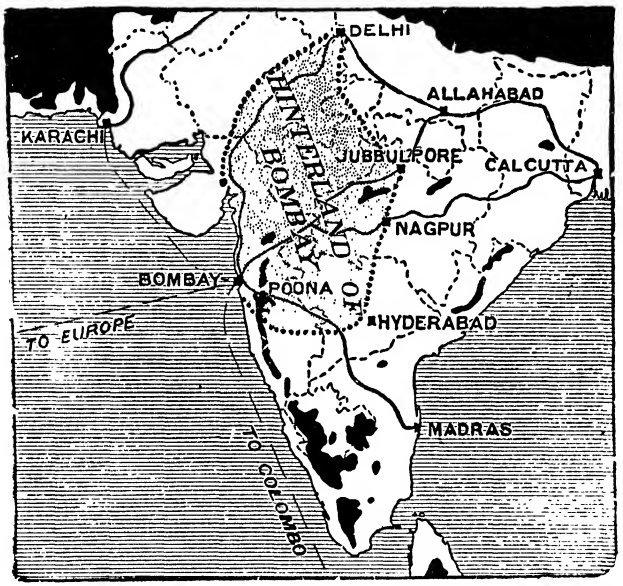



**Fig. 202. The Hinterland of Bombay**

*Linseed* forms the most important export next to cotton and cotton manufactures, but the value is only about one-thirteenth part of that of the raw cotton.

*Sesamum and Ground-nuts* also used for making oil are both important.

*Raw Wool* from the sheep which feed on the dry pastures is another export, also hides (as the skins of

buffaloes and oxen are called), skins (of goats and sheep), leather (manufactured from hides and skins). A little rice and wheat may sometimes be exported, the latter from the Narbada Valley.

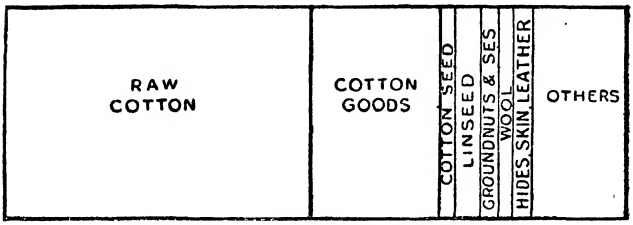



**Fig. 203. The Exports of Bombay**

Now, where are these exports of Bombay sent to? A very large amount of the raw cotton goes to Japan. Japan is a country which can manufacture cotton goods very cheaply but cannot grow much cotton of her own because the climate is too cold. A large quantity goes

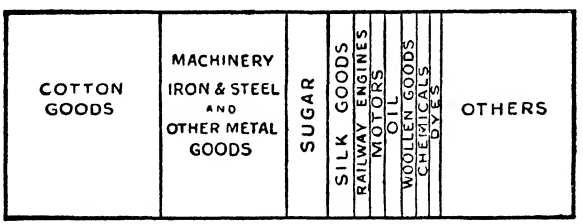



**Fig. 204. The Imports of Bombay**

to China. Most of the remainder goes to the busy, industrial countries of Europe—Great Britain, Italy, France, Belgium and Germany.

The manufactured cotton goods are not sent nearly so far away. The people in all the countries near India need clothes and so buy them from the mills at Bombay. These countries are Mesopotamia, Straits

Settlements, Ceylon, Persia and the British Colonies in Africa.

The cotton seeds and linseeds go to Great Britain.

The people of France and Italy use a lot of oil in cooking their food and so they buy the sesamum and ground-nuts.

Germany buys buffalo and cow hides, but the United States of America buy the goat and sheep skins.

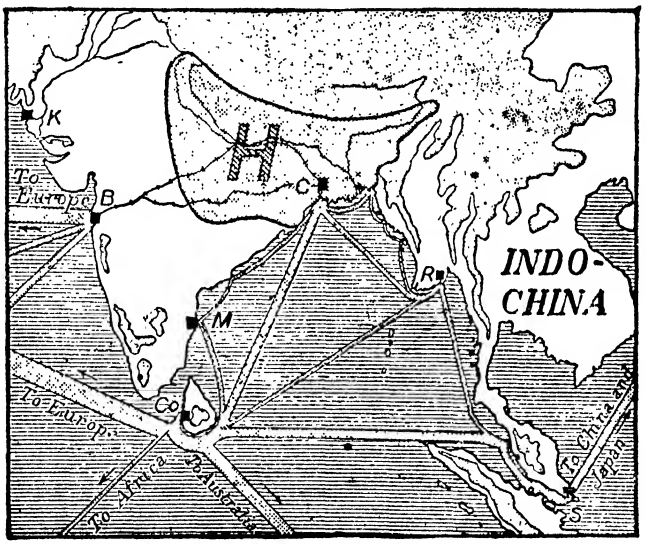



**Fig. 205. Trade and steamship routes to Calcutta**

C, Calcutta; B, Bombay; K, Karachi; Co, Colombo; M, Madras; R, Rangoon; S, Singapore; H, the Hinterland of Calcutta. Land over 3,000 feet dotted.

Since India is mainly an agricultural country and manufactures are only carried on at a few big cities like Bombay and Calcutta, we find that the agricultural products, like the raw cotton sent away by Bombay

and the jute sent by Calcutta are exchanged for manufactured goods which have been made in the busy countries of Europe and America. Fig. 204 shows the imports of Bombay. Every year now India manufactures more of her own sugar and imports less than shown in Fig. 204. But more motor cars, and more oil and petrol to run them, are now being imported.

*Cotton Goods.*—Cotton goods come mainly from Great Britain, where the famous cotton mills of Lancashire can make some of the best cotton goods in the world. Japan also sends cotton goods, and as the Japanese goods are cheaper than those of Lancashire, India is buying more and more of them. Italy, Holland and other countries in Europe send a little.

*Machinery.*—All kinds of machinery, iron and steel goods, hardware, etc., are sent to India. The greater part comes from Great Britain but the United States send a lot and so do Germany and Belgium.

*Silk goods* from China, Japan and Italy.

*Railway Engines* from Great Britain, *Motors* from the United States, Canada, Great Britain and the Continent.

*Oil* from the United States, *Woollen goods* from Great Britain, *Dyes* and *Chemicals* from Britain and Germany.

The people in India are very fond of gold and silver ornaments. A few years ago the gold and silver brought into Bombay were worth nearly as much as all the other imports put together. The gold came from Natal (it is found in the goldfields of South Africa) and Great Britain. It is not found in Great Britain, but was taken there from other countries first. Australia used to send some and so did the United States. The silver came from the United States, Great

Britain, Australia and China. But since 1931 the people of India have been selling their gold and silver and sending away large quantities every year. This is because gold and silver have been worth many more rupees per tola than formerly.

4. **Calcutta.**—The whole of the great Ganges Valley and indeed nearly all of North-Eastern India form the 'hinterland' of the great port of Calcutta. (See Fig. 205.) There is only one other port in the north-east—Chittagong—and so we can judge the exports of this part of India by the goods which pass through the port of Calcutta. Fig. 206 shows their relative values.

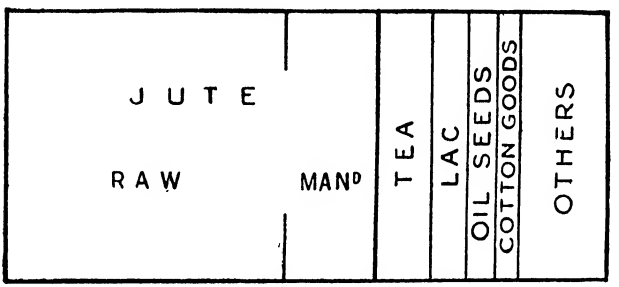



**Fig. 206. The Exports of Calcutta**

*Jute and Jute Manufactures.*—By far the most important export from the port of Calcutta is jute. It is more valuable than all the other exports added together and in some years is more than twice all the others. Even if we take the whole of India, we find jute forms one quarter of the whole exports. Jute is the cheapest fibre in the world for making bags. It is exported as bags, or as canvas or 'raw', that is ready to be manufactured abroad. The Deltas Region of North-eastern India is the only important jute-producing region in the world and the jute is sent to all countries of the

world. Huge quantities go to North America (United States and Canada), England, Germany, Argentine, Australia, Java, China and Japan.

Jute is a crop which is largely grown for export and more than two-thirds of the total produce is sent out of the country.

*Tea.*—Tea is generally the second most important export sent from Calcutta but is a long, long way behind jute. The tea comes mainly from the Brahmaputra Valley and part of the Sub-Himalayan Region in Northern Bengal. It is roughly one-tenth of the total trade of Calcutta. More than three-quarters of the tea is sent to the United Kingdom. Other countries which buy tea are Canada, the United States and Australia.

*Lac.*—Lac is also a valuable export. It comes from the forests of the hilly regions and is sent mainly to the United States (which buys two-thirds of the supply), the United Kingdom, Germany and France.

*Oilseeds.*—Oilseeds, including ground-nuts, sesamum, rape or mustard and linseed, are sent mainly to France, the United Kingdom and Belgium. Oilseeds are largely grown for export and about one-fourth of the total crop is exported.

*Hides and Skins.*—The United States is the most important customer, taking most of the skins; followed by the United Kingdom and Germany.

*Grain.*—We have seen what an enormous quantity of rice is grown in the Deltas Region, Middle Ganges Valley. Yet the population is so dense that nearly all the rice is eaten by the people themselves. The same is true of other grains, so that the amount left for export is very small. Indeed, in many years Calcutta has to import large quantities of rice from Burma.

Other exports include coal, Indigo, opium, metals and oils.

Fig. 207 illustrates the relative value of the imports of Calcutta. The following are the most important: —

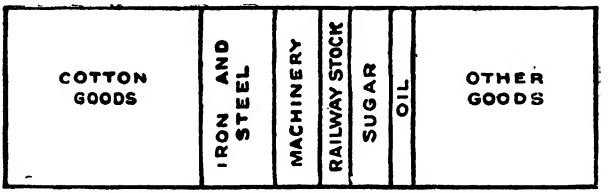



**Fig. 207. The Imports of Calcutta**

*Cotton Goods for Clothing, etc.*—As in Bombay these are the most important and constitute more than one-third of the whole in value. They come from England and Japan. There is now a large import of artificial silk.

*Metal and Metal Manufactures: Motor cars and Machinery, together with Iron and Steel and Railway Engines and Railway materials.*—Iron and steel goods, including motor cars and machinery, are easily second in importance and make up roughly one-quarter of the total in value. The United Kingdom supplies the greater part, with some from the United States and Germany.

*Sugar.*—Sugar used to be a very important import and came largely from Java. Now India produces most of her own.

*Mineral Oil.*—Some of the mineral oil imported through Calcutta comes from Burma, but the United States also supplies large quantities.

Other imports include silk, paper, salt and liquors, also timber and rice from Burma.

The trade of Chittagong is growing but is still less than 10 per cent of that of Calcutta.

5. **Karachi.**—Fig. 208 shows the extent of the hinterland of Karachi. Only about 5 or 10 per cent of the exports of the Punjab, North-West Frontier Province and Kashmir go to the port of Bombay and still less to Calcutta. The exports of Karachi repre-

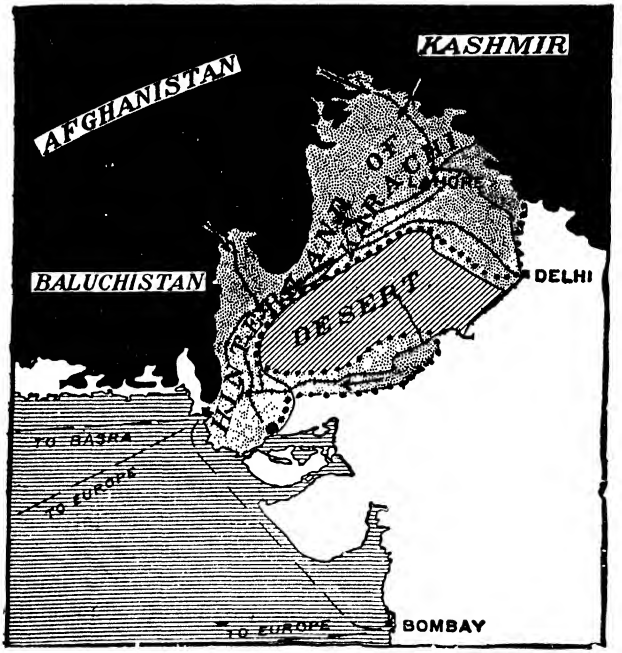



**Fig. 208. The Hinterland of Karachi**

sent the surplus products of North-Western India. Fig. 209 shows their relative values.

*Raw Cotton.*—As with Bombay, raw cotton is the most important export of Karachi. The cotton grown in the Punjab is the American type, with a longer staple

than the native Indian cotton grown in the Deccan Lavas Region, so most of the cotton exported from Bombay goes to Great Britain and not to Japan.

**Fig. 209. The Exports of Karachi**

*Wheat and Wheat Flour.*—Most of the white races of Europe eat bread made from wheat flour. Most of the surplus produced in the Punjab goes to Great Britain, but in most years now the people of India require all the wheat for themselves and there is little export.

*Oilseeds* again go to France and Belgium.

*Raw Wool, Gram, Skins, Hides and Rice* are the other exports of Karachi.

The imports of Karachi are very like those of Bombay or Calcutta. They are shown in Fig. 210.

*Cotton Goods, together with artificial silk,* now come from England, Germany, Italy and Japan.

*Sugar* used to come mainly from Java, but Karachi also imported considerable quantities of beet sugar from Germany and Hungary and cane sugar from Mauritius. Now there is very little imported.

**Fig. 210. The Imports of Karachi**

*Metals and Machinery* come from Britain.

*Mineral oil* is brought from Persia.

6. **Madras.**—This port is often called Fort St. George, from the old name of Madras. Remember that the trade of Madras is very much less than Bombay

as shown by Fig. 211 drawn on the same scale as Fig. 203. The most important exports are leather, skins and hides which are sent to the United States and Great Britain.

**Fig. 211. The Exports of Madras**

*Cotton* (raw) is sent to Great Britain and Japan. *Cotton goods* to Ceylon and countries near India.

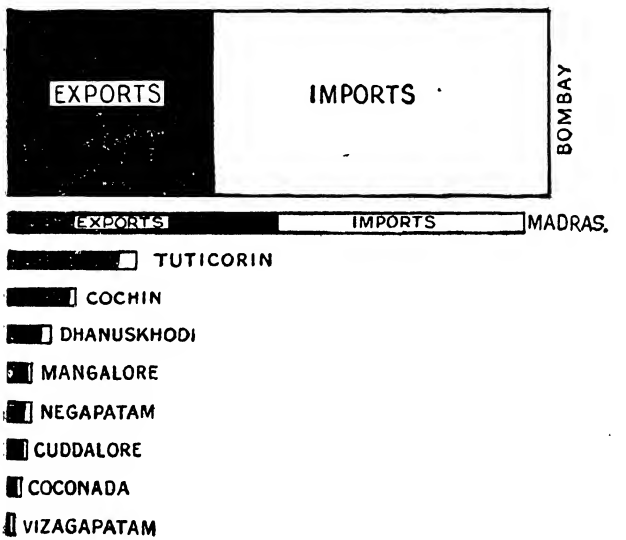



**Fig. 212. The Trade of the smaller ports of Peninsular India, compared with that of Bombay**

*Ground-nuts* are sent to France where the people use much ground-nut oil.

Notice from what parts of the hinterland of Madras these products come.

The imports of Madras are just like those of Calcutta or Bombay and come mainly from the same countries.

The trade of the smaller ports of Peninsular India is not a large one and is mainly an export trade. It is shown in Fig. 212.

Since Fig. 212 was drawn, the harbour at Cochin has been dredged and large steamers call there. So the trade of Cochin is rapidly increasing and is now nearly half that of Madras. Cochin exports the products of the warm, wet south-west including rubber and coconut products as well as tea from the Nilgiri Hills.

Vizagapatam also has a good harbour now, but its trade has not increased so rapidly.

7. **Direction of Trade.**—Let us go back to the trade of the whole of India and see what countries are her best friends—those who buy goods from her and send her others in exchange. Find all these countries on the maps in your atlas.

Fig. 213 shows by means of a little diagram India's best customers. By far the biggest is Great Britain. Notice how much India is helped by the other countries of the Empire who buy her goods. The share of Japan has grown greatly and is now larger than shown in the diagram. Belgium is also a good customer.

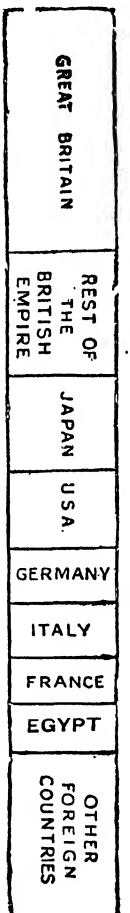



Fig. 213. The trade of India by countries (exports)

Fig. 214 shows the countries which send India goods. Notice again what a lot of trade is with the countries of the Empire. The imports from Japan have increased greatly and are now more important than the diagram shows.

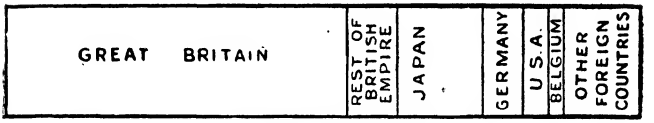



**Fig. 214. The trade of India by countries (imports)**

8. **Shipping.**—The ships which bring the goods to India and take others away, belong to different nations. More than three-quarters of the steamers are British or Indian and nearly three-quarters of the goods brought to or taken away from India were in these steamers. The most numerous foreign ships are Japanese, Italian, American and German.

A great deal of money has to be paid to the owners of the steamers who carry the goods. If the steamers belong to foreign countries that money is paid away and does not benefit India or any other country of the Empire. If the steamers belong to one of the countries of the Empire that money stays in the Empire and helps to build up trade.

9. **Overland Trade.**—India is surrounded by mountain walls and the amount of trade crossing these mountains—the foreign overland trade of India—is very small.

*Overland Trade of India* is mainly with Persia (through Baluchistan), Afghanistan (through the Khyber Pass) and Nepal (from the Ganges Valley).

*Overland Trade between India and Burma.*—A small trade passes through the Taungup and An Passes and through Manipur.

In connection with the overland trade of India study Fig. 7 carefully.

10. **India's Position and World Trade.**—Look at your atlas and see how well situated India is for trade. Notice the main trade routes to other countries. Take the exports and imports of India and try to see which way they will come or go. At present there are no easy ways out of India except by steamers. One day we may have railways direct to certain other countries like China. Aeroplane services now fly between London and Karachi, linking up with the Indian air services to Delhi, Calcutta, Rangoon, Bangkok, Singapore and Australia. At present only letters and passengers are carried and the time occupied from London to Calcutta is five days. A postal packet by steamer, takes fourteen days from Bombay to London. At the present time a great deal of the commercial business of India is carried on by means of cablegram and telegram. A message can be sent from Bombay or Madras to any part of the Empire and a reply received in a short time in this way; a merchant can get a reply from London in a day.

## QUESTIONS AND EXERCISES

1. From which Natural Region of Peninsular India do you think most of the (i) wood, (ii) cotton, (iii) lac, (iv) leather comes from? Why?

2. If you were a merchant in (i) West Coast, (ii) Upper Ganges Valley, (iii) Carnatic, (iv) Rajput Uplands, what commodities would you try to deal in? Why? (Remember a merchant both buys and sells.)

3. Can you foresee any change which may take place in the future in the trade of (i) Chota Nagpur, (ii) Deccan Lavas Region,

(iii) West Coast Region, (iv) Lower Indus Valley, (v) Baluchistan? Explain.

4. If Burma / Australia / United Kingdom etc. (countries of the Empire) broke away from the Empire and declared war on the rest, how would the people of India be affected?

# CHAPTER XXXVIII

## BURMA

1. **General.**—Until April 1st 1937 Burma was one of the provinces of the Indian Empire. It was actually the largest province and the area is more than 260,000 square miles. Part of Lower Burma (Arakan and Tenasserim) became British in 1826, part (Pegu) in 1852 and the rest (upper Burma) in 1886. Now Burma is a Republic with a Government of its own. It is different from India in very many ways. The principal inhabitants are the Burmans, they are more like the Chinese than the Indians and by religion they are Buddhists. Then Burma is less thickly populated than India and there are only 14,700,000 people.

2. **Government.**—Burma is ruled by a President with a council of ministers and a Legislative Council. But within the boundaries of Burma there are large areas called the Federated Shan States and Karenni which are ruled by their own chiefs (called Sawbwas) and are thus like the states of India.

3. **Physical Features.**—The chief mountains and river valleys of Burma run from north to south.

The mountain ranges are arranged like the fingers of a hand pointing to the south. The first finger, in the west, is formed by the mountain wall which separates India and Burma. The principal chain is the Arakan Yoma. The mountains are difficult to cross and most people come to Burma by sea. Then comes the valley of the River Chindwin which joins the Irrawaddy. A low range runs from north to south

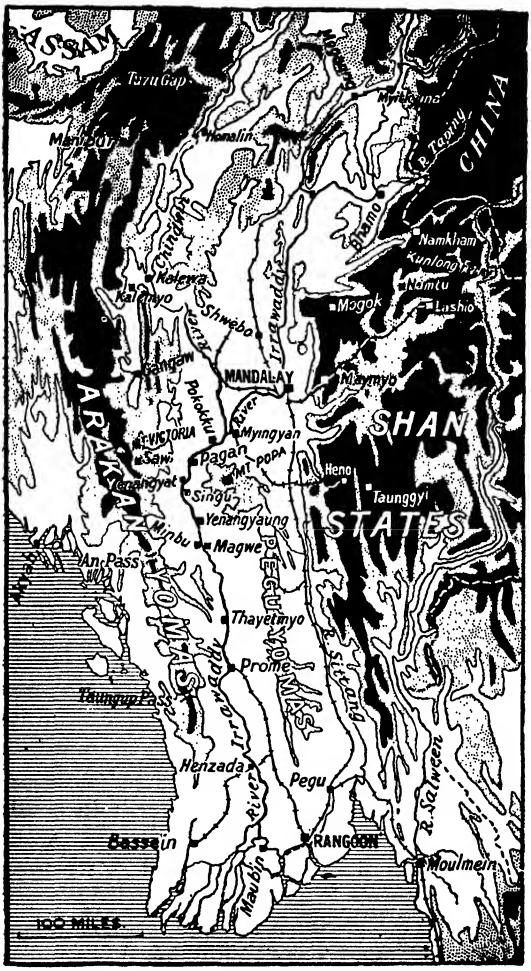



**Fig. 215. General map of the heart of Burma**

Land over 1,000 feet, dotted; over 3,000 feet, black.

between the valley of the Chindwin and the valley of the Upper Irrawaddy and is continued as the Pegu Yoma between the valley of the Lower Irrawaddy and the valley of the Sittang. Then in the east of the country is the wide plateau of the Shan States divided into two halves by the deep, narrow valley of the Salween. In the heart of Burma is the extinct volcano of Mount Popa, nearly 5,000 feet high. The most fertile and important part of Burma is the broad valley of the lower part of the Irrawaddy and its great delta.

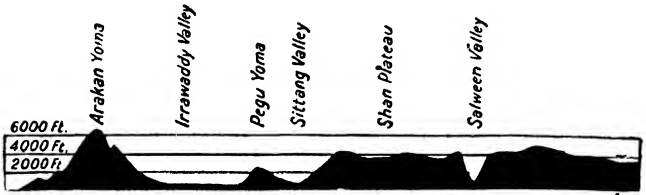


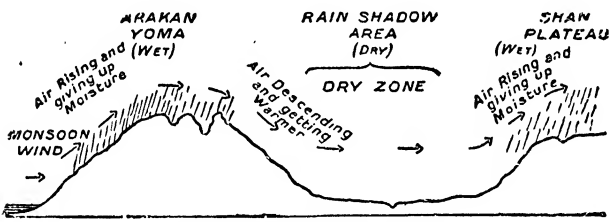

**Fig. 216. Section across Burma from west to east**

4. **The Rivers of Burma.**—Like the Ganges and Brahmaputra the rivers of Burma are mighty streams fed partly by mountain snows, and having water all the year round. The rivers flow in the valleys between the 'fingers' of Burma (see paragraph 3). Between the first and second fingers are the Chindwin and the lower course of the Irrawaddy. Between the second and third fingers we find the Upper Irrawaddy and, further south, the small Sittang. Notice how the Irrawaddy crosses over the second finger. Between the third and fourth fingers is the Salween.

5. **Geology and Minerals.**—The plateau of the Shan States and its continuation southwards into Tenasserim consists of ancient rocks but most of them are not

quite as old as the rocks of Peninsular India. The old rocks are rich in minerals. There is silver and lead in the north at Bawdwin mines, silver further south and much tin and tungsten in Tenasserim. In the north are also the famous Burma Ruby mines where rubies, spinels and other precious stones are found. The remainder of Burma, the centre and the west consist of young folded mountains. In the heart of Burma are the famous oilfields. Burma has a little coal but it is only poor quality.

6. **The Climate of Burma.**—The Climate of Burma is very like that of India. The heart of Burma is sheltered from the South-West monsoon by the Arakan Yoma and so there is a Dry Belt or Rain Shadow area as shown in Fig. 217.




*SECTION ACROSS BURMA*

**Fig. 217. Showing Rain-Shadow**

7. **Natural Vegetation.**—In Burma, as in India, there are evergreen forests where the rainfall is more than 80 inches, monsoon forests where the rainfall is between 40 and 80 inches and scrub forest or scrub land where the rainfall is less than 40 inches. Because Burma is not so thickly populated as India, there are fine forests over large areas and timber working is important. The most valuable timber is teak, from the monsoon forests. The pyinkado, or Burma ironwood,

is another important tree, largely used for railway sleepers. The Pine trees of the mountains yield

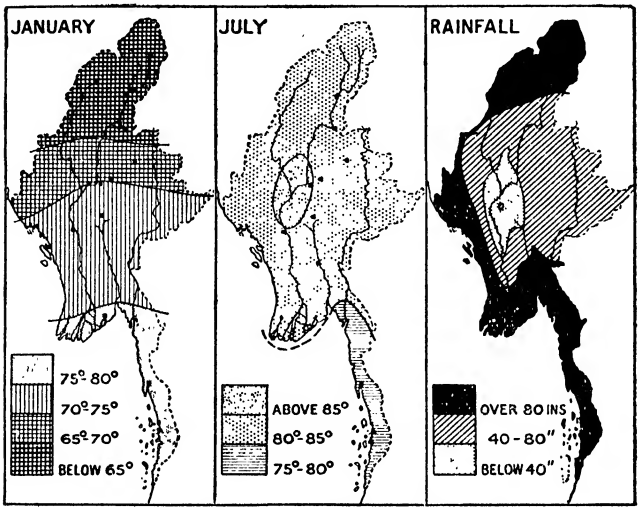



**Fig. 218. The climate of Burma**

fine soft wood, as well as timber and resin, but the forests are difficult to reach. Mangrove forests are

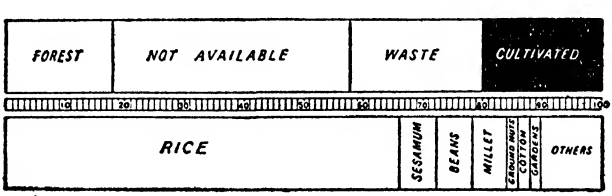



**Fig. 219. The use of the land in Burma**

Burma grows much more rice than her people can eat.

found in Deltas and are valuable for the fuel they yield. Bamboo is very common and much used in the building of houses.

8. **Agriculture in Burma.**—Fig. 219 shows that much land is still waiting to be cultivated in Burma and that, in the country as a whole, the chief crop is rice. The other crops are found particularly in the 'Dry Zone'.

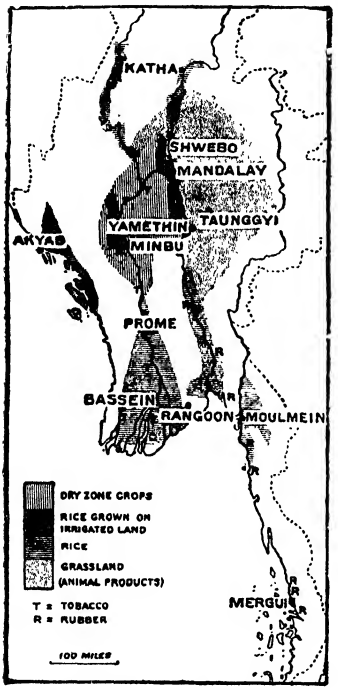



**Fig. 220. The crops of Burma**

9. **The Races of People in Burma.**—Just as India was invaded again and again from the north-west, so Burma was invaded again and again from the north. But the people who poured into Burma were quite different from those who went to India. Burma was invaded by Mongol people—that is people like the Chinese, with yellowish or yellowish brown skin, smooth broad faces and straight black hair. Nearly all the people living in Burma are Mongols. As in India the wilder peoples were driven away to the hills, the latest invaders and the cleverest (the Burmans) seized the most fertile lands of the river valleys. Fig. 221 shows the distribution of races in Burma. Compare it with a physical map and see how the Chins, Shans, Was, Palaungs and Kachins who are the

less educated or less civilized peoples, live in the hills.

10. **The Natural Regions of Burma.**—Burma, as we have already said, is very distinct from the rest of India and falls into seven natural regions. One of these (the Western Hills Region) is part of the Eastern Hills Region of India and comprises the Mountain Wall which separates Burma from India. The other regions are:—

(1) The Arakan Coastal Strip—very wet, hilly, very thinly populated.

(2) The Tenasserim Coastal Strip—very wet, hilly or mountainous, covered with evergreen forest, very thinly populated.

(3) The Shan Plateau—a plateau

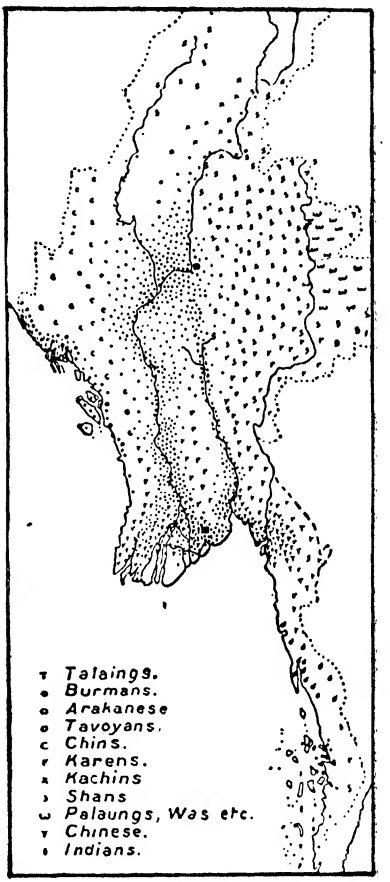



**Fig. 221. Map showing distribution of races in Burma**

Each dot, or symbol, represents 10,000 people.

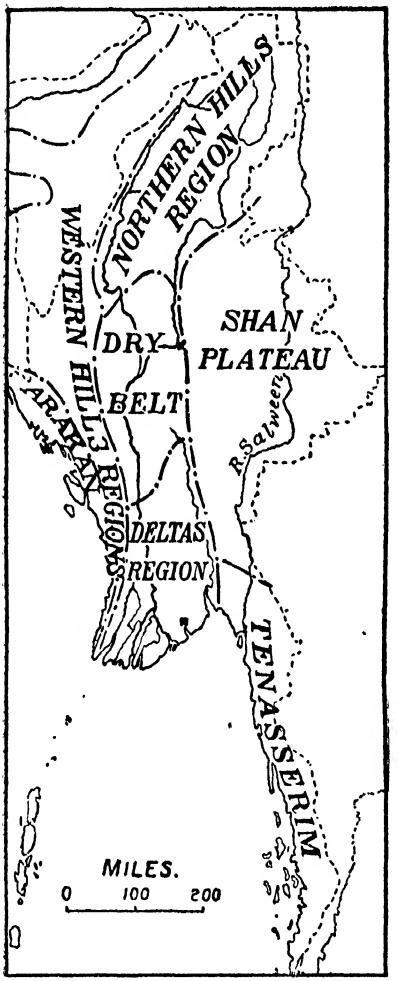



Fig. 222. The Natural Regions of Burma

of old rocks, moderately wet, thinly populated and backward.

(4) The Northern Hills Region—a hilly region, sloping southwards, wet or very wet, undeveloped.

(5) The Dry Belt—a dry plain, fairly thickly populated.

(6) The Delta Region—mainly an alluvial plain, wet to very wet and devoted to rice cultivation, divided into two parts by a forest-covered range of hills.

# CHAPTER XXXIX

## BURMA—THE ARAKAN COASTAL STRIP[1]

1. **General Features.**—This natural region of Burma is the narrow strip between the Western Hills Region of Burma (the Arakan Yomas) and the sea. We shall see later that the Tenasserim coastal strip is similar in many respects.

In Arakan the strip of plain between the mountains and the sea is widest in the north and narrowest in the south. We see also that near Akyab there is a delta area and that in other places the sea has worn away the coast, leaving islands. The two most important islands are Ramree Island and Cheduba Island.

Seeing that the coast is much broken in these places, and that there are large numbers of islands behind which ships might shelter during storms, we should expect that there would be plenty of good harbours and large ports where they could load and unload their cargoes. But there are no large ports; Akyab is a busy place, but cannot be compared with Rangoon, and big liners do not go there. There are two reasons for this. One is that in many places the coast is dangerous because of rocks and shoals, and the other is that a great port cannot grow up unless behind it is a large district full of people, who grow or manufacture things for export, and who can buy large quantities of goods brought by sea from other places. Behind the towns on the Arakan Coast,

[1] Comprises the greater part of the Arakan Division (Districts of Akyab, Kyaukpyu and Sandoway), except the eastern mountainous parts; and the coastal strip of the Bassein District.

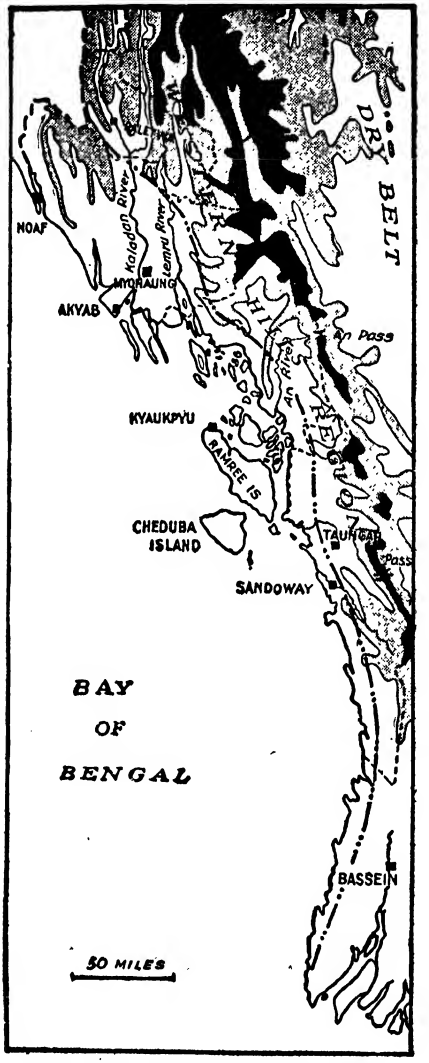



Fig. 223. Arakan Coastal Strip

there is a narrow plain, backed by high mountains. We may notice that the most important part, Akyab, is situated where the coastal strip is widest.

2. **Climate.**—The Arakan coastal strip and the Tenasserim Coastal Strip are very wet regions—with more than eighty inches of rain. Nowhere else in Burma is the rainfall so heavy as it is in these Natural Regions. We should expect that, since the coastal Strip Region is an area of heavy rainfall, the range of temperature would be slight. This is the case. In Akyab it is fifteen degrees. In the hot weather, the cool sea breezes that we read of at the beginning of Chapter V make the climate of the coastal strips much more pleasant than that of inland places.

3. **Minerals.**—The Arakan Coastal Strip is built up of young soft rocks, and so we might expect to find mineral oil there. We do find some oil, especially near Akyab, but there is not very much. That is because the young sedimentary rocks have been much folded by earthquake movements, and the oil which once existed has been squeezed out of them. At some places natural gas bubbles out of the ground and brings up mud with it, forming a 'mud-volcano'. Sometimes new islands are formed on the Arakan Coast by these mud-volcanoes. The natural gas is given off by the oil in the ground, just as water evaporates and gives off water vapour, except that the *whole* of the oil does not change to gas in this way.

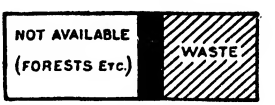



**Fig. 224. Proportion of cultivated land in Arakan**

Cultivated land in black.

4. **Crops.**—In the Arakan Division, only one-tenth of the land is cultivated. One-half of the land is not available for cultivation, consisting of hills and forests, but one-third of

the land could be used and is not. Fig. 224 shows this.

The fact that the Arakan Coastal Region is hilly and wet, and therefore covered in most places with thick forest or jungle, explains why half of it is not available for cultivation. But since the other half could be used for crops, why do not the people grow them? The answer to this is in two parts: (*a*) The whole area is thinly populated, so that there are not enough people to do the work required. (*b*) The climate is very hot and wet; therefore, jungle grows very fast indeed, and the amount of work necessary to keep the jungle down is so great that each cultivator is fully occupied with working the piece of land he already holds without undertaking to cultivate new ground.

Rice, as seen in Fig. 225, is the chief product. The sea provides the second great product of Arakan—fish.

Since teak will not grow where the rainfall is more than eighty or ninety inches, the timber which is exported from Arakan is chiefly wood other than teak.

5. **Towns.**—The chief town in the Arakan Coastal Strip is *Akyab*. It has grown up because it has a good situation. We may notice that it stands in the widest part of the coastal plain; it has a sheltered harbour; the Kaladan River provides a road to the north, and the Lemru River provides another road into the hills eastward. Also, Akyab is situated conveniently for the fisheries of the coast and of the islands around, and it is the nearest Burmese port to India. The advantages of its position are shown in Fig. 226.

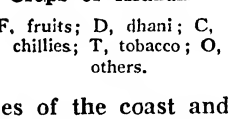



**Fig. 225. The Crops of Arakan**

F, fruits; D, dhani; C, chillies; T, tobacco; O, others.

Other towns and important villages are *Paletwa* (head-quarters of the Arakan Hill Tracts), *Kyaukpyu* (a rice port), and *Sandoway*.

6. **The Andaman and Nicobar Islands.**—Although not part of this natural region, the Andaman and Nicobar Islands may be mentioned here. Notice from your atlas that they form the continuation of the mountain chain of the Arakan Yomas. Like the Arakan Yomas they consist of a number of ranges of hills running from north to south, separated by deep valleys. The whole is covered with dense evergreen forest or other luxuriant vegetation. The native inhabitants are wild tribes of small people called Negritos with black curly hair, but they are dying out. Until recently the Andaman islands were used as a convict settlement. Large numbers of prisoners were sent there, and a staff of guards to look after them. A number of the convicts have settled in the islands after becoming free. The principal town of the islands is Port Blair on the South Andaman Island. The Nicobar Islands have large areas covered with coconuts.

**Fig. 226. The position of Akyab**

Land over 250 feet, black.

## QUESTIONS AND EXERCISES

1. Describe the climate of Akyab.
2. How could the productiveness of the Arakan coast be increased?
3. Show why there are practically no railways in the Arakan Division. Do you think they would be useful?
4. Find in your atlas coastal strips in other countries like the Arakan Coastal Strip.
5. What is a 'mud-volcano'?
6. Describe the geographical advantages of the position of Akyab.

# CHAPTER XL

## BURMA—THE TENASSERIM COASTAL STRIP[1]

1. **General Features.**—The Tenasserim Coastal Strip Region in many ways is very like the Arakan Coastal Strip. The area lies between the crest of the Tenasserim Yomas and the sea. The other (eastern) side of the Yomas forms part of another natural region, but that is part of Siam. Like Arakan, the Tenasserim Coastal Strip consists of numerous parallel ranges. The strip is broadest in the north and narrowest in the south, and there is one important delta area. That is the delta of the Salween with Moulmein near the mouth of the river. Notice that its position in this region is very like the position of Akyab and the surrounding lowland in Arakan.

There are many islands off the coast, the group to the south is called the Mergui Archipelago. As in Arakan, there are few large ports, for the country has few people and few important productions. The most important port, Moulmein, is situated where the coastal strip is widest and where there is a fertile plain producing much rice.

2. **Climate.**—The Tenasserim Coastal Strip is, on the whole, a little hotter than the Arakan coast, because it is nearer the equator. The range of temperature is even less than on the Arakan coast. In Moulmein and Tavoy it is only 9 and 10 degrees

[1] Comprises the whole of the Tenasserim Division.

Fig. 227. The Tenasserim Coastal Strip

respectively. It is very wet and many places have more than 200 inches of rain.

3. **Minerals.**—Although the climate is very like that of the Arakan Coastal Strip, the rocks which build up the Tenasserim Region are very different. They are old, hard rocks, old sedimentary rocks with many large masses of crystalline rocks. Valuable ores of tin and ores of tungsten or wolfram are found in many places. Tungsten is used for mixing in small quantities with iron to make very hard steel suitable for machinery. Tavoy is the most important centre for the export of tin. Some of the tin ore is mined in the hard rocks, but much of it has been washed out by rain and rivers (see Chapter III), and is found in the beds of the

rivers. Tin and tungsten were very much needed by the Empire during the Great War, and Burma produced 7,000 tons of tin ore and 20,000 tons of tungsten ore from 1916 to 1921, worth about 650 lakhs of rupees. Nearly all of this came from the Tenasserim Coastal Strip.

4. **Crops.**—Much of the Tenasserim Coastal Strip is covered with very thick forest, and the trees are often very large indeed. It is too wet for teak, and the other woods have not been very much used yet. Up

**Fig. 228. The proportion of cultivated land in Tenasserim**

Cultivated land in black.

the River Salween there is a drier area where teak grows and the logs are floated down to Moulmein. The vegetation grows so quickly that it is very difficult for cultivators to grow their crops and prevent them

**Fig. 229. The crops of Tenasserim**

R, rubber; D, dhani; B, betel; S, sugar; O, others.

being choked by weeds. Sometimes, too, the rain is so violent that it washes the poor cultivator's seeds out of the ground and destroys his crops. So we find that only one-tenth of the Tenasserim region is cultivated, and a great part of this cultivated area is in

the alluvial tract near Moulmein. One-half or more is covered with forest, but one-third is described as 'waste'. The chief crops of the region are rice, fruit and vegetables, rubber, dhani, betel and sugar. The diagram, Fig. 229, shows the proportion of land devoted to each. Notice that rice is by far the most important. The rubber plantations are chiefly in Mergui and Tavoy.

**Fig. 230. The position of Moulmein**

Since there are many islands on the Tenasserim coast, and many arms of the sea run into the land, the people have to use boats for travelling and this has taught them to be fond of the sea. They are great fishermen, and Mergui is famous for its salted fish and dried fish called ngapi. Pearl oysters are found in the sea around the Mergui Archipelago, and from them 'mother-of-pearl' and pearls are obtained.

5. **Towns.**—The most important town in this region is *Moulmein* (see Fig. 230), and there are good reasons why it has grown to be an important place. It is near the mouth of the great river, the Salween, and thus has a sheltered harbour. Unfortunately, owing to the silt brought down by the Salween, the harbour is full of shoals, and is not suitable for very large ships; but it is quite good enough for small steamers and sailing vessels. Then the logs from the forests can be floated down the Salween to Moulmein. Thirdly, the road to Siam is not far away, and, fourthly, there is the railway from Pegu and Thaton, and the new railway southward to Ye. The advantages of the position of Moulmein are shown in Fig. 230. Notice in this figure, too, the position of Thaton, which is a 'gap' town. Opposite Moulmein is *Martaban* (the terminus of the railway, connected by ferry with Moulmein); other towns are *Amherst, Ye, Myittha, Tavoy, Mergui,* and *Tenasserim.*

The southernmost point of Burma is Victoria Point. From here it is only a short distance across the Isthmus of Kra (through Siam) to the Gulf of Siam and one day a canal may be dug through this isthmus.

## QUESTIONS AND EXERCISES

1. Draw two sketch-maps showing the similarity and differences between the Arakan and Tenasserim Coastal Strips.

2. Who are the inhabitants of Tenasserim? Describe their modes of life.

3. In what ways are the positions of Akyab and Moulmein similar? What advantages does Moulmein possess which Akyab lacks?

# CHAPTER XLI

## BURMA—THE SHAN PLATEAU[1]

1. **General Features.**—In Burma, that part named 'The Federated Shan States' is a plateau. Generally, it is between 3,000 and 4,000 ft. high though there are numerous higher ridges.

The Salween passes through the plateau, and the part east of the Salween is higher than the part west of it. The western portion is the more important, and the highest point in it is just south-west of Lashio. To the south of the plateau, but forming part of the same natural region, is Karenni. Here the plateau has been cut up by the action of rivers into a number of parallel mountain ranges. The inhabitants here are Karen and not Shan, as over most of the natural region.

2. **Crops.**—The 'grass-lands' are the most important part of the Shan Plateau. On them cattle are reared, and crops grown. A great part of the Shan Plateau consists of limestone which is often more suitable for the growth of grass than for trees. The grass-lands on limestone soil have one big disadvantage, unfortunately, that is that the soil is porous, and allows the water to soak through it. Therefore, although the Federated Shan States have a good rainfall, the water passes away too quickly, and does not stay in the soil. The result is that the best fields are those situated in the low-lying places where the water collects, and in such places the villages are situated.

[1] The Federated Shan States and Karenni, with part of Katha and Mandalay Districts.

**Fig. 231. The Shan Plateau**

Land over 1,000 feet, dotted; over 3,000 feet, black.

You may pass through miles of higher country and see but very little cultivation. But grass does not require as much water as other crops need. Therefore, the Federated Shan States are very suitable for the rearing of sheep, goats, horses and cattle. The rearing of these animals is one of the most important occupations of the plateau.

In the low-lying parts which are suitable for crops, rice is grown, potatoes, vegetables of all sorts, fruits (oranges, pineapples, strawberries, etc.), and in some places, wheat. Tea is an important crop on the hill-slopes and mulberry trees are grown because it is on these that the silkworm feeds. These districts, which are the most valuable parts of the plateau, are inhabited chiefly by the Shans. The more hilly parts of the plateau are of much less importance. There are valuable forests providing timber, but it is as yet little used. The Kachins and Palaungs, whose villages are to be found in the hills, generally grow only the crops they themselves need. Near the bottoms of the valleys, bamboo is plentiful. Lac is gathered all over the Federated Shan States. In the south, in Karenni, there are valuable teak forests in the valleys.

3. **Minerals.**—The Bawdwin or Namtu silver and lead mines are very important. Find Namtu on Fig. 231. There, silver and lead are found together, and are smelted in this industrial village hidden away in the midst of the hills. It produces a larger amount of wealth than any other place in the Federated Shan States. There are also important tin mines at Mawchi, on the borders of Karenni and Tenasserim.

At Mogok are the ruby mines, making another industrial centre. Near Kalaw at Loi-an, an attempt has been made to work the coal which exists there.

4. **Towns.**—The Shweli and the Myitnge provide gateways from Burma to China. Along both these roads there is a considerable Chinese trade. In the case of the Shweli, the trade has given rise to the important market town of *Namkham*, on the frontier where the Shweli enters Burma (Fig. 231). Most important of all the frontier towns is *Bhamo*, where the road trade ends and the river trade (on the Irrawaddy) begins. In the case of the Myitnge, the trade crosses the Kunlong Ferry. On the Myitnge itself, is *Hsenwi*, where the road begins to rise, leaving the Myitnge Valley to cross over into the Salween Valley. Mandalay is the place where the road trade ends and the river trade begins, in connection with this route.

To the east of the Salween, *Keng Lung* is the collecting place for trade and can now be reached by motor road all the way from Rangoon via Kalaw.

*Taunggyi* is the head-quarters of the Government of the Federated Shan States, and *Kalaw*, near the western edge of the plateau, is a healthy place which provides a pleasant change in the climate from the heat of the plains.

## QUESTIONS AND EXERCISES

1. Why do the Federated Shan States form a Natural Region?
2. Draw a sketch-map to show why Taunggyi is a good centre of Government for the Shan States.
3. Do you think the Shan States will ever become an important part of Burma? Give your reasons fully.
4. Summarize all that you have learned about the trade routes between Burma and China.
5. State what the map tells you about the routes which Chinese invaders have used to invade Burma at various times in history.

# CHAPTER XLII

## THE NORTHERN HILLS REGION OF BURMA[1]

1. **General Features.**—The natural region we have called the Northern Hills Region forms the northern part of the great Central Basin. It stretches from the 'mountain wall' which bounds Burma on the north as far south as the Dry Belt. Both the River Chindwin and the Irrawaddy have their sources in the northern parts of this natural region, and, as we might expect, the land slopes gradually from the mountains of the north towards the south. On the west is the valley of the Chindwin, in the east are the Mali-Kha and the Mai-Kha which join above Myitkyina to form the Irrawaddy. In the south, flowing through the middle of the region, is the River Mu.

The railway from Rangoon crosses the Irrawaddy by a new bridge at Sagaing (opened in 1934) and then runs north-eastwards to Myitkyina. From Myitkyina there is a mule track about 290 miles in length to Putao (Fort Hertz), the centre of the most northern district of Burma.

2. **People.**—The hilly and mountainous northern parts of this natural region are inhabited by hill-tribes. The country between the Chindwin and the Irrawaddy is the great Kachin area. Shans are also found there, especially in isolated patches in the valleys. The Hukawng Valley and the alluvial land around Putao are inhabited by Shans. Just on the borders of the

[1] The North-East Frontier Division with the Katha and Upper Chindwin Districts of the North-West Border Division.

**Fig. 232. The Northern Hills Region of Burma**

Shan Plateau there are many Shans and Kachins and a few Palaungs. The fertile valleys of the Chindwin, Mu, and Irrawaddy are inhabited mainly by Burmans.

The famous jade of Burma comes from this region, and is brought over the hills to the railway at Mogaung. Amber comes from the Hukawng Valley, and there is one oilfield in the soft rocks of the Chindwin Valley.

Although Burma is surrounded by a mountain wall, these peoples—Talaings, Burmans, Kachins, Shans, originally came over the mountain wall from Tibet and have moved southwards. As we have seen, the Northern Hills Region slopes towards the south, and there has been a natural flow of people from north to south. The people move southwards, the products are sent southwards. Naturally the thoughts of the people are towards things in the south. As we say, their 'outlook' is towards the south. The people of the Arakan Coast live in a narrow strip of country with high mountains at the back and the sea in front. It is very difficult to climb over the mountains, but it is easy to move from one place to another on the sea. So we say their outlook is towards the sea.

3. **Crops.**—The mountains are clothed with dense hill-forest consisting largely of rhododendron, but with pines in places. Further south are rich monsoon forests with teak and other trees, and where the forests are near the river, timber is extracted. Rice is grown for the needs of the people, and in considerable quantities in some broad parts of the river valleys. In the north of Shwebo, just where the Northern Hills Region joins the Dry Belt, the fertile alluvial soil produces good grass, and there are large numbers of cattle. Although the flat valley land is very limited in extent in the Northern Hills region, in the districts of Katha and

Upper Chindwin there are large numbers of cattle, horses, sheep, pigs and goats.

4. **Towns.**—There are few important towns in this region. *Kalewa* is a river-collecting station on the Chindwin, *Homalin* is the furthest point usually reached by steamers on this river. At the middle, in the Mu Valley, where the Northern Hills Region passes into the Dry Belt, is *Yeu*. Further north on the railway are *Wuntho* and *Mogaung*, villages situated at the foot of the hills and forming two of the centres to which the hill tribes come down to purchase luxuries. To Mogaung the jade is brought from the hills. On the River Irrawaddy is *Katha*. Notice from Fig. 232 that Katha is a gap town, and that there is a short railway running through the gap and joining the main railway. From Katha a steamer runs daily to Bhamo. Bhamo is a town which receives a large proportion of the overland trade from China.

## QUESTIONS AND EXERCISES

1. Draw a sketch-map of the Northern Hills Region, putting in the principal valleys, and showing where the different inhabitants live.

2. Draw a sketch-map showing the advantages of the position of Mogaung.

3. Describe the vegetation of the Northern Hills Region.

4. What is meant by the 'outlook' of a people?

5. Although the Hukawng Valley route offers a fairly good road from Burma to India, it is not much used yet. Can you give any reason for this?

# CHAPTER XLIII

## THE DRY ZONE OF BURMA[1]

1. **General Features.**—The centre of Burma forms the Dry Zone. In the part of Burma shown in Fig. 234 there is less rainfall than anywhere else in Burma and the driest places are round about Pakokku and Myingyan. These places have just over 20 inches of rain in a year, and we may say that all places in Burma which have a rainfall of less than 40 inches belong to the Dry Zone.

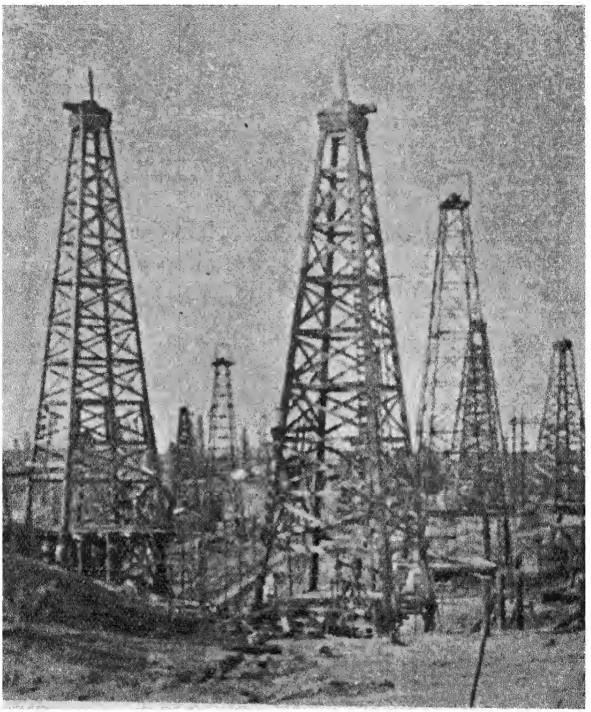
About the centre of the Dry Zone the Irrawaddy flows in a south-westerly direction, and the junction of the Chindwin and Irrawaddy, that is to say, Myingyan, is in the middle of it. The region is generally flat, with the exception of the low range of hills which is the northern continuation of the Pegu Yoma. Mt. Popa is a high isolated mountain at the northern end of the range. We should expect that the rainfall on Popa would be rather more than that on the plain around it, and this is the case. Popa is a volcano, but it is now extinct, i.e., it no longer throws out lava and ashes.

2. **Climate.**—The Dry Zone is particularly hot in the months of March, April and May, because it receives no cooling sea-breeze, and the sun shines brilliantly on its level plains. In the months of December and January the Dry Zone is cooler, generally speaking, than the other parts of the Central

[1] Comprising roughly the whole of the Mandalay Division and the North-West Border Division except the mountainous western parts and except Katha and Upper Chindwin, together with the Thayetmyo District.

Basin, because level plains which are far away from the sea cool very quickly.

The region gets less than 40 inches of rain in the whole year.



[*Photo : L. D. Stamp*

**Fig. 233. The oilfield of Yenangyaung**

When the rain comes, the ground is often so hard and so dry that the water runs off and rushes down the 'chaungs' and does not help the soil at all.

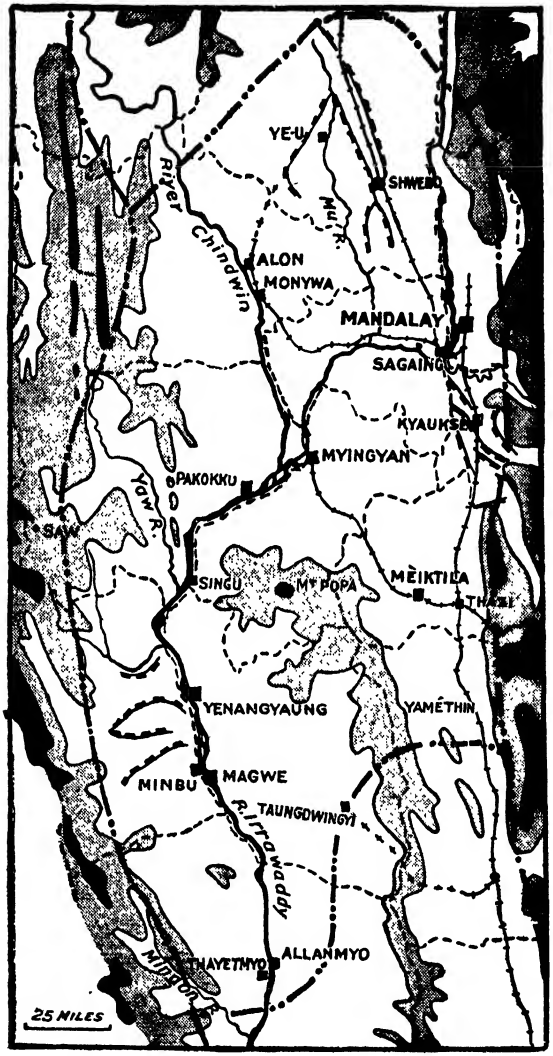



Fig. 234. The Dry Belt of Burma

From the time of the early Burmese kings, the people of the Dry Zone have built and used tanks and canals in order to provide themselves and their crops with water. Since Burma has been a member of the British Empire, the Government has spent large sums of money in improving these old canals and building new ones. The chief canals are shown in Fig. 234 by black lines. In the Shwebo District more than half of the land used for crops is watered by means of canals. In Kyaukse, seven-tenths of the crops are watered by canals; in Yamethin, one-third; in Mandalay, one-half; in Minbu, one-third.

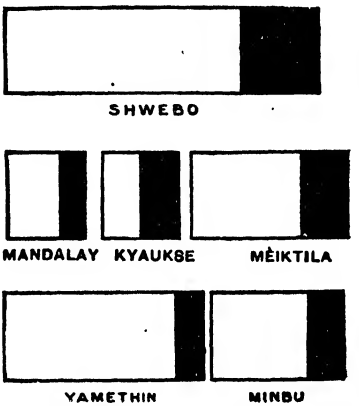



**Fig. 235. Proportion of irrigated crops in the Dry Belt (by districts)**

The total cultivated area in the principal districts is shown, with the irrigated portion in black.

The land around Mandalay and Kyaukse is most valuable, because there more than one-half of the ground used for crops is so well watered by the canals that the fields easily give two crops a year.

3. **Crops.**—Rice is the greatest crop in all Burma, but the Dry Zone provides only a small portion of rice. Yet even in the Dry Zone rice is a very important crop. This region leads Burma in the production of white beans. Many other crops are also produced, and Fig. 236 shows the proportion of ground for each. After rice we see that the largest amount of ground

is used for sesamum, millet and beans. Then come groundnuts, which like a very loose sandy soil, cotton, which grows on the rich black soil south-west of Mandalay and on the red gravel of the hills of Thayetmyo, and food for cattle. Tobacco grows on the rich soil of the river banks, and maize in the damper places. Toddy, sugar, onions, and tomatoes are also products of the Dry Zone.

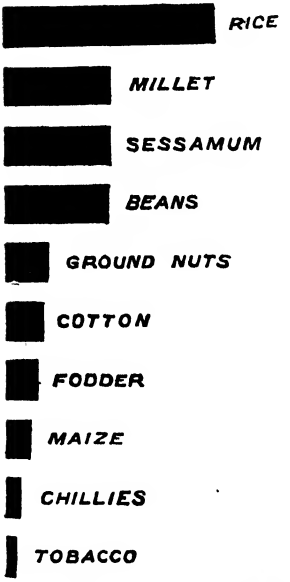



**Fig. 236. The crops of the Dry Belt**

4. **Minerals.**—You learnt in Chapter III that the young, soft rocks which build up the Dry Belt Region often carry oil. All the most important oilfields of Burma are found in the Dry Belt. They are Yenangyaung, Singu, Yenangyat and Minbu. At Singu the oilfield stretches underneath the River Irrawaddy itself. On the opposite shore (at Lanywa) a sandbank has been enclosed by a wall two miles long and a new oilfield formed. Many years ago the oil was obtained by digging wells; now holes 3,000 or more feet in depth are drilled by special machinery, and the oil is pumped up. The oil is then sent to Rangoon either by special oil-steamers or by a pipe which has been laid all the way from Yenangyaung to Rangoon (300 miles). Many ocean-steamers burn oil instead of coal nowadays, but Burma's oil is too good

for that purpose. It is 'refined' in the 'Refineries' and split up into its component parts—petrol for motor cars, kerosene for lamps, and wax for candles. After rice, petroleum or oil and its products are by far the most important exports of Burma. The machinery used is imported largely from America. Here you see Burma must obtain the proper machinery and skilled operators from other countries before she

[*Photo*: *L. D. Stamp*

**Fig. 237. A bullock cart laden with cotton from the Dry Zone of Burma being taken to the railway**

can obtain the oil which is buried in her own land. The most important centre of the oil-mining industry is at Yenangyaung, but the most important refineries are near Rangoon—at Syriam on the Rangoon River.

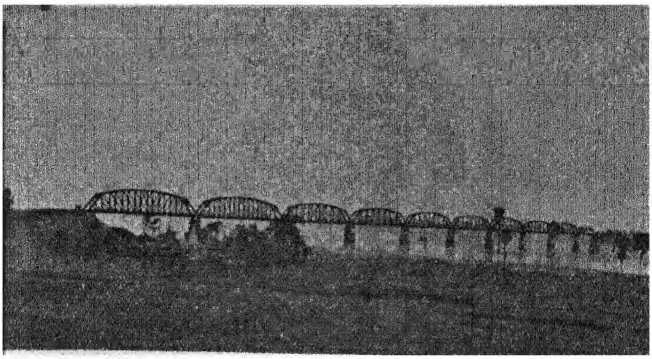
5. **Towns.**—Several of the old Burmese capitals are situated in the Dry Zone, and are not very far away from one another. They are Mandalay, Amarapura, Ava, Shwebo, and Pagan. There were good reasons why this part of the Dry Zone should be a good site for capitals in those ancient days.

In the first place, Burmans are a land nation rather than a seafaring nation. They came originally from the great continental regions, and only in historic times have displaced the Talaings and other inhabitants of the coastal regions. Now the capital of a land empire should be near the centre of the country. It must be in such a position that the communications in all directions are good; in order that the king may keep in touch with all parts of his dominions, and his armies can march to all parts of the country. In the second place, the climate should be healthy—as it is in the Dry Belt. The ancient capitals are near the centre of the country, and in such a position that communication in all directions is easy. The centre of the country is just about where the Irrawaddy flows west from Mandalay, and roads lead from this capital to all parts of Burma—one road goes north to Bhamo; another follows the Chindwin Valley; a third leads by way of the Myitnge River to the Chinese Frontier. There are also two roads going south—one, a river road, the Irrawaddy Valley, and the other the Sittang Valley route.

In recent years Burma has made great progress and is taking her place amongst the nations of the eastern world. This means that much trade must pass between Burma and other countries.

The need for communication with the outside world explains why Rangoon is now a more suitable capital than one in the centre of the country.

The railway from Rangoon to Myitkyina over 700 miles north, is now continuous. Until 1934 there was a break between Amarapura and Sagaing, just south of Mandalay, where a steam ferry crossed the River Irrawaddy. But now a fine new bridge—the Ava bridge—has been built. It took nearly seven



[*Photo*: *L. D. Stamp*

**Fig. 238. The Ava Railway and Road Bridge across the River Irrawaddy near Mandalay**

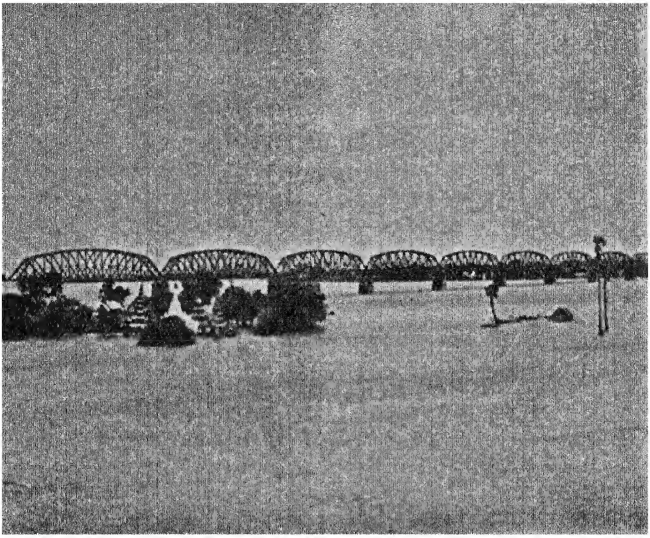
Dry season, February.

years to build, and cost almost 150 lakhs of rupees.

Some of the other towns in the Dry Zone have positions which are also interesting to study.

There are two towns on opposite banks of the Irrawaddy—*Thayetmyo* and *Allanmyo*. They are there because they are on the border between the Dry Zone and the wetter region of the south. Through them the trade between the two districts must pass. Further north are *Minbu* and *Magwe*, which act as collecting stations for the products of the Dry Belt. The local goods are collected there and shipped down the river.

*Monywa*, *Mandalay*, *Pakokku* and *Myingyan* are also 'River Ports'. Just as a port on the sea-coast collects trade from the land and sends goods by sea, getting in return other goods brought by ships, so river ports, in exactly the same way, collect the trade of the land by road and send away goods and produce by river boats, taking in return goods brought to them from places in other parts of the river valley. A big



[*Photo: L. D. Stamp*

**Fig. 239. The Ava Bridge—High water season**

River in flood, August.

cotton-mill has been opened in Myingyan to manufacture the raw cotton grown in the Dry Zone. *Pagan* is the centre for the lacquer industry. *Shwebo* is the centre of the northern part.

### QUESTIONS AND EXERCISES

1. Describe the climate of the Dry Belt.
2. Draw a sketch-map of the Dry Belt, shading differently the parts producing most rice, cotton, groundnuts. How do you explain this distribution of crops?
3. Give an account, with sketch-maps, of irrigation in Burma.
4. Draw a sketch-map, illustrating the position of Pakokku, Monywa, and Sagaing.
5. Draw a sketch-map of Burma, showing the oil-producing regions of Burma. How is the oil obtained and where is it sent?
6. Draw a sketch-map to show the means of communication in the Dry Belt. Which routes are the most important?
7. Give an account of the river ports of the Irrawaddy, and describe the trade that goes on.

# CHAPTER XLIV

## THE DELTAS REGION OF BURMA[1]

1. **General Features.**—The great Central Basin of Burma is divided into three parts by its climate. We have studied the northern part which is the Northern Hills Region, the middle which is the Dry Belt, and there remains now only the southern part, which we have called the Deltas Region. It includes nearly the whole of the Sittang Valley and the Sittang Delta, the greatest part of the Pegu Yomas, the Irrawaddy Valley from Prome southwards, and the Irrawaddy Delta.

To enable us to study it more carefully we may divide the region into three parts:—

(*a*) The Lower Irrawaddy Valley and the Delta. The apex of the Delta proper is at Henzada.

(*b*) The Sittang Valley and Delta.

(*c*) The Pegu Yomas separating the two valley regions.

2. **Climate.**—The temperature of this part of Burma is warmer than that of the Dry Zone in the cold weather, and cooler than that of the Dry Zone in the hot weather. It has a more equable climate. The rainfall of the Deltas Region is everywhere good, and we notice that the rainfall increases gradually as we leave the borders of the Dry Zone and go southwards. Prome, which is just outside the Dry Zone, has 47 in., Henzada has 84, and Bassein 109 in. Most of the places in the Irrawaddy Delta have roughly 100 in., including Rangoon (99 in.). The Sittang Delta has

[1] Comprising roughly the whole of the Rangoon, Irrawaddy, and Pegu Divisions, except the District of Thayetmyo.

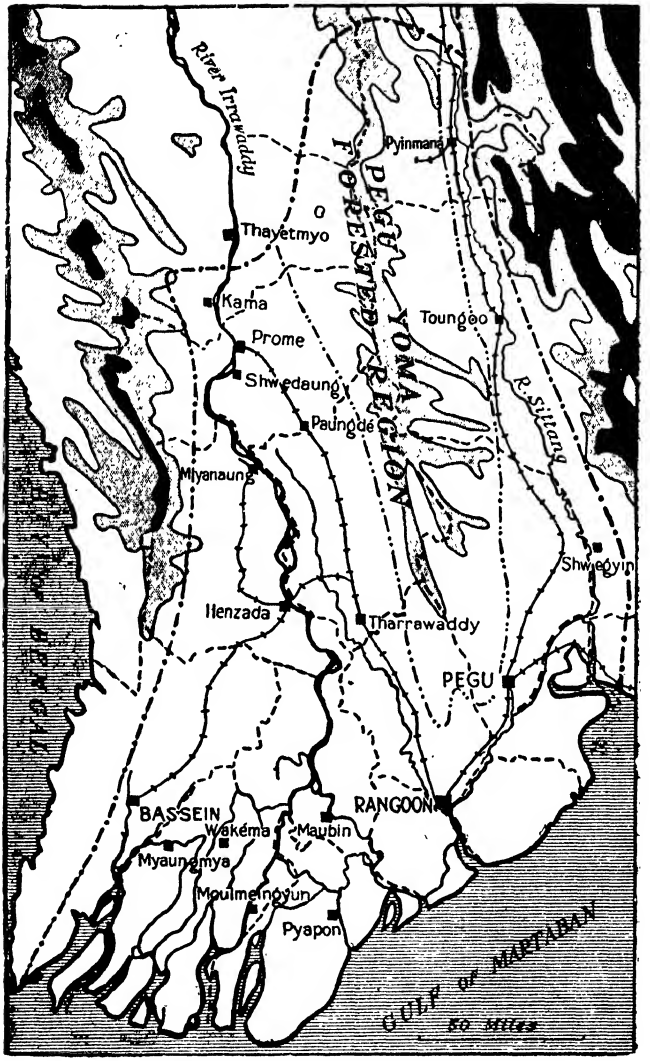



**Fig. 240. The Deltas Region**

rather more (Pegu, 128) and Toungoo in the Sittang Valley has 81. Everywhere the rainfall is sufficient for the growth of forests and for the cultivation of paddy. Now we will look at the three parts into which we have divided the Deltas Region.

3. **The Lower Irrawaddy Valley and the Delta.**—This is a piece of country with no high hills, and consists of soft alluvium. Now, alluvial soil is very fertile, and the level, fertile land with a proper rainfall is ideal for rice. More than half of the paddy grown in the whole of Burma is grown in this area. As a result this is also the most thickly populated part of Burma. The inhabitants are mostly Burmans, but scattered amongst the Burmese villages in the Delta are villages inhabited entirely by Karens. Many Indians are employed as coolies. Naturally the villagers require other crops for their use besides rice, and so fruit and vegetables are important. Tobacco is another important crop; it is found on the rich alluvial soil of the river banks, which are covered during the high-water season.

A considerable amount of good land in Burma is wasted, and not used for cultivation. In the Delta less than a quarter is wasted. The rich, alluvial soil in a district with a heavy rainfall is far too valuable for it not to be used.

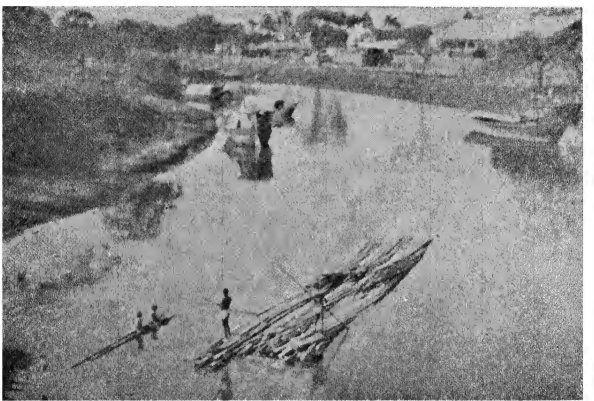
4. **The Sittang Valley.**—The Sittang Valley is much narrower than that of the Irrawaddy, and its delta is much smaller. But they have the same rich, alluvial soil, and this much smaller area produces one-fifth of the paddy grown in the whole of Burma. The whole of the Deltas Region, as we see by adding this amount to that coming from the Irrawaddy Delta, produces 70 per cent of the total rice crop of Burma.

The inhabitants of this thickly populated tract are also Burmans.

5. **The Pegu Yomas.**—The Pegu Yomas form a very different tract of country. They consist of fairly young rocks which are not very hard, and the mountains are not high—only a few peaks are more than 2,000 feet high. But almost everywhere they are clothed with fine forest. In the south, where the rainfall is 90 in. or more, it is evergreen; but the greater part is monsoon forest, that is, forest in which the trees are leafless in the hot season. Here and there, occupying clearings in the forest, are villages inhabited by Karens, but the Pegu Yomas are very thinly populated when compared with the valley tracts on either side. The Pegu Yoma forests are very important for their production of teak, which is by far the most valuable tree. Better forests may be found in other parts of Burma, but none are so accessible, that is, none are so near where the timber is required. So great has been the demand that these forests would probably by now be entirely cut down if Government had not 'reserved' them and carefully looked after them. The Government Forest Officers survey the forests very carefully, and mark or kill by 'girdling' those trees which are old enough and big enough to be felled. Trees which are small and young are left to grow

**Fig. 241. The crops of the Deltas Region**

bigger. The trees are actually felled either by Government or by one of the companies who have leased the right to work timber. The logs are dragged into a stream—either by elephants or bullocks —and, when the rains come, are floated down into bigger streams. On the east the logs float into the Sittang, and are then sent through the Pegu-Sittang Canal to the saw mills at Rangoon. On the west they



[*Photo*: *L. D. Stamp*

**Fig. 242. Part of the Pegu-Sittang Canal near Pegu, Deltas Region**

are floated down a stream, which eventually becomes the Hlaing or Rangoon River. We must remember that timber, mainly teak-wood, is the fourth most important export of Burma—after rice, petroleum and metals.

6. **Towns.**—It will be easiest to study the towns of the Deltas Region as we have studied the climate and productions, in sub-divisions. There are no towns of importance on the forest areas of the Pegu Yomas.

(*a*) *Lower Irrawaddy Valley.*—The chief towns are on the river bank, because the Irrawaddy is the great highway for this part of Burma. Examples of such river towns on the Lower Irrawaddy are Prome, Shwedaung and Myanaung. *Prome* has always been an important town, because it is in that part of the country where the products of the Dry Belt give place to those of the wetter regions, and there is a considerable exchange of products. It has retained its importance because it is the terminus of the railway from Rangoon, and the point where the railway traffic and the river traffic meet. *Myanaung* is an example of a town which has declined. It was once a great river port; now its trade has been taken by Prome and Henzada. *Taungdwingyi* is in an interesting position. It is quite on the border line between the Dry Belt and the Pegu Yoma Forests. It may be compared to such a town as Mandalay, being a 'gap' town, and it commands an important route across the Pegu Yomas from the Irrawaddy to the Sittang. The towns at either end of the route are *Magwe*, a river port, and *Pyinmana*, a railway centre. A railway has recently been built from Pyinmana to Taungdwingyi; it is being continued to the foot of the Mt. Popa.

*Henzada* is a 'ferry' town. It owes its importance to two facts: it stands at the apex of the Delta proper, and thus makes a kind of frontier town between the Delta proper and the Lower Irrawaddy Valley, and forms a centre of trade at which the peoples of these two areas meet; secondly, it is the place where the Rangoon line to Bassein crosses the Irrawaddy by railway ferry.

(*b*) *Sittang Valley.*—In this section we find an example of the effect of a railway on the development of a district. Almost all the important towns and

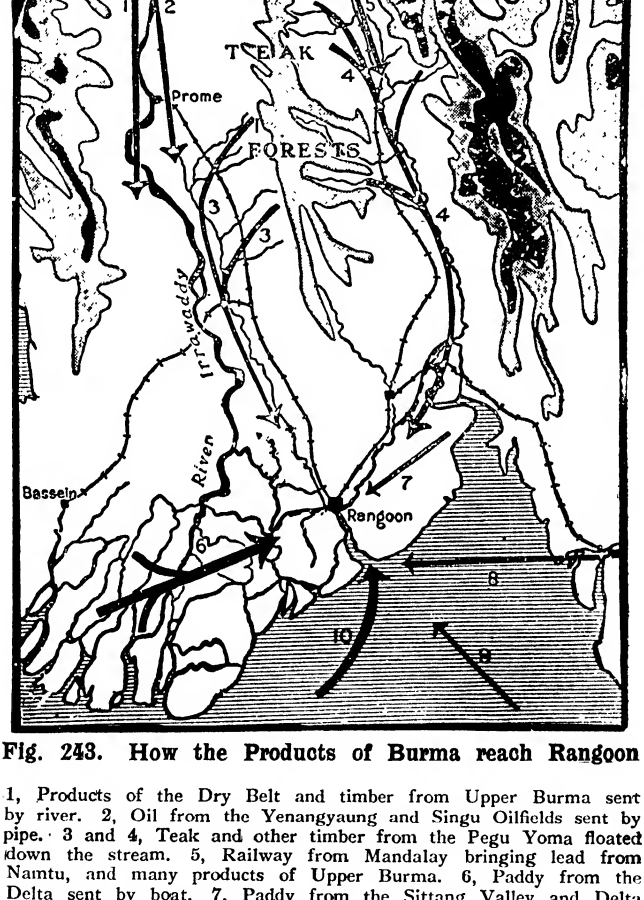



**Fig. 243. How the Products of Burma reach Rangoon**

1, Products of the Dry Belt and timber from Upper Burma sent by river. 2, Oil from the Yenangyaung and Singu Oilfields sent by pipe. 3 and 4, Teak and other timber from the Pegu Yoma floated down the stream. 5, Railway from Mandalay bringing lead from Namtu, and many products of Upper Burma. 6, Paddy from the Delta sent by boat. 7, Paddy from the Sittang Valley and Delta sent by boat. 8, Paddy and timber from Moulmein. 9, Tin from Tavoy, also goods from Japan, China and Java. 10, Steamers from the Arakan Coast, India, Ceylon, and Europe. Notice that a town in any other position could not command the land and water highways of both the Irrawaddy and Sittang Valleys.

villages of the Sittang Valley are those on or near the railway, like *Toungoo* and *Pegu*, while those towns which were once important, but are now not touched by the railway have declined, such as *Shwegyin*, which was once an important river port on the Sittang, but now has its trade limited to lumbering and rubber-growing. This decline is largely due to the fact that the River Sittang is of little use for navigation although of great value as a highway down which timber can be floated to Rangoon.

Pegu owed its importance in ancient times to the fact that it stood at the entrance of the Sittang Valley. It is important now because it is a railway junction.

(*c*) *Delta.*—In the Delta section, Rangoon stands out by itself. The other towns may be classed as 'Delta collecting centres', and will be considered later on.

*The Port of Rangoon.*—Rangoon is by far the greatest port of Burma. The Rangoon River provides a safe harbour and has a high tide; the whole of Burma, producing rice, oil, timber, beans and many other things, and needing machinery and manufactured goods, is its 'hinterland': and the Irrawaddy and the railway provide communication and transport. Rangoon stands in a unique position. It stands on the southernmost spur of the Pegu Yomas and commands both the Irrawaddy and Sittang Valleys. The products of the Irrawaddy Delta and Sittang Delta can reach Rangoon by water, but railway and road communications with the Irrawaddy Valley to Prome and Sittang Valley and Mandalay (*via* Pegu) are equally easy. Study Fig. 243 carefully.

Rangoon was a busy place two hundred years ago, but since Burma has become a member of the British

Empire, it has leaped forward and has become one of the great ports of the world.

The most important of the 'Delta collecting centres' is *Bassein*. It is specially favoured by the fact that big ocean-going steamers can reach it, while the trade of the other centres is limited to river boats. Its trade is almost entirely the export of rice collected from the delta by means of 'paddy' boats.

*Myaungmya*, *Maubin* and *Pyapon* are other delta centres. To these, and to similar places, the cultivators of the Delta bring their paddy. Most of it is taken by boat to Bassein or to Rangoon, to be milled into rice and then exported. Fishing is an important industry in the Delta, the collecting centres dealing with this trade also.

## QUESTIONS AND EXERCISES

1. Compare the position of Bassein and Rangoon. Do you think Bassein will ever become as important as Rangoon? Give reasons.

2. A gentleman in Calcutta requires some teak-wood for building. Show how the timber would reach him from the forest to Calcutta.

3. What is meant by 'hinterland'? Which has the more important hinterland, Rangoon or Moulmein, and why?

4. In what ways are the lower valleys of the Sittang and Irrawaddy Rivers similar, and in what ways do they differ?

5. Name the duties of the Government 'Forest Department' officers.

6. What is a 'gap town'? Give examples from Burma.

7. Give geographical reasons to show why the following towns have at various times been important in the history of Burma: Pegu, Toungoo, Prome, Ava.

8. Explain why Rangoon has become a greater port than Akyab, although Akyab is much nearer India.

# CHAPTER XLV

## COMMUNICATIONS IN BURMA

1. **Rivers.**—Burma is plentifully supplied with rivers, and owing to the low cost of river transport, this is the most important form of communication in the country. There are canals in Burma, but they are nearly all for the purpose of irrigation, and are not used for transport. Good motor roads in Burma are rapidly increasing in importance. From the earliest times, the River Irrawaddy and its tributary, the Chindwin, have formed the great highway of Burma, and the construction of the railway has not decreased their importance to any great extent. River steamers can travel on the Irrawaddy from the sea to Bhamo at all times of the year, a distance of about 700 miles. In the rains, the Irrawaddy is a broad, deep river, nearly two miles wide at Bhamo, but in the dry season it is difficult work to navigate even flat-bottomed boats, for the river then has much less water in it, and there are sandbanks and islands which move their position from year to year, so that many towns on the river banks are left at considerable distance from the water's edge. The Chindwin is navigable in the rains from its junction with the Irrawaddy up to Homalin, 330 miles, but its stream is rapid and contains many whirlpools and shallow places.

In the Delta, the many mouths of the Irrawaddy and the thousands of creeks which connect them form almost the only means of communication.

We thus can divide the river communications of Burma into four sections: (*a*) Chindwin; (*b*) Irrawaddy, between Mandalay and Bhamo; (*c*) Irrawaddy, between Mandalay and Henzada; (*d*) Delta creeks. We will deal with each of these in turn. The Salween is not much used because of the rapids about 100 miles from its mouth. It is navigable higher up in the Shan States, but goods brought down have to be unloaded and carried across to Papun, and sent down the rest of the journey to Moulmein from there.

(*a*) *Chindwin.*—Steamers travel up the Chindwin at all times of the year as far as Pantha and Mawlak, and in the rains can reach Homalin. The trade along the river is not very important because the greater part of the course is included in the Northern Hills Region, which is not very productive, and the valley in most places is narrow. For this reason there are not many 'river ports' along its course. The chief are Homalin, Pantha, Kalewa, Alôn and Monywa.

Homalin is an example of a town or village situated at 'the head of navigation'.

Pantha is the river port for the oilfield of Indaw.

Kalewa is the 'port' for the Chin Hills, and is situated where the Myittha River joins the Chindwin. The Myittha from Kalemyo southwards is navigable for country boats, and flows through a fertile valley. At Kalemyo the river is joined by the road to the Chin Hills. Unfortunately, between Kalemyo and Kalewa there are rapids, and goods have to be carried by land for a short distance.

Alôn and Monywa are the river ports for the district west of the Zibyu Range, just as Sagaing is the river port of the district east of it. Both Alôn and Monywa are connected with Sagaing by railway, and at these

places many goods are unloaded from the Chindwin steamers and sent to Sagaing and Mandalay. Compare Prome.

(*b*) *Upper Irrawaddy between Mandalay and Bhamo.*—This part of the Irrawaddy, like the Chindwin, is very beautiful. In three places, the river passes through narrow gorges known as the Defiles. The First Defile is thirty-five miles long, near Sinbo, above Bhamo. The Second Defile is between Bhamo and Shwegu village, and the Third is near Thabeikkyin. The trade on the Upper Irrawaddy is more important than that of the Chindwin, for whereas the Chindwin carries only the trade of the hills and the narrow valley strip, that of the Upper Irrawaddy not only deals with the products of the hills on either side, and the valley strip, but is also fed by the two land routes from China—the route along the River Taping leading from Tengueh in Yunnan straight to Bhamo, and the route along the Shweli River Valley which meets the China frontier at Namkham and ends on the Irrawaddy near Katha. Thus the chief 'river port' on this section of the river is the place where the goods brought by the land route on mules are transferred to the steamer, namely, Bhamo.

Thabeik-kyin is the river port for the ruby mines of Mogok.

(*c*) *The Middle Course, Mandalay to Henzada.*—This is the main highway of Burma. At its northern end the trade of the northern Hills Region and the trade from China are connected; it passes through the Dry Zone, and also through the rich Lower Irrawaddy districts of Prome, Henzada and Tharrawaddy. This explains why there is a string of 'river ports' strung out along its length, the chief being Mandalay, Sagaing, Myingyan, Pakokku, Chauk, Seikpyu,

Yenang-yaung, Minbu, Magwe, Minhla, Allanmyo, Thayetmyo, Prome, Shwedaung, Myanaung and Henzada.

The situation of Mandalay has been fully discussed in Chapter XLIII. All that has been said there shows that Mandalay is naturally a collecting place for the products of the districts round about it, and also forms a convenient centre from which goods from other districts or from other countries can be distributed.

Sagaing is the river port for the rich agricultural and irrigated lands of the Mu Valley, and its importance increased while it was the terminus of two railways, one going to Shwebo and Myitkyina, and the other to Monywa and Alôn. Now that the ferry across to Amarapura has been replaced by a railway bridge Sagaing may lose some of its traffic.

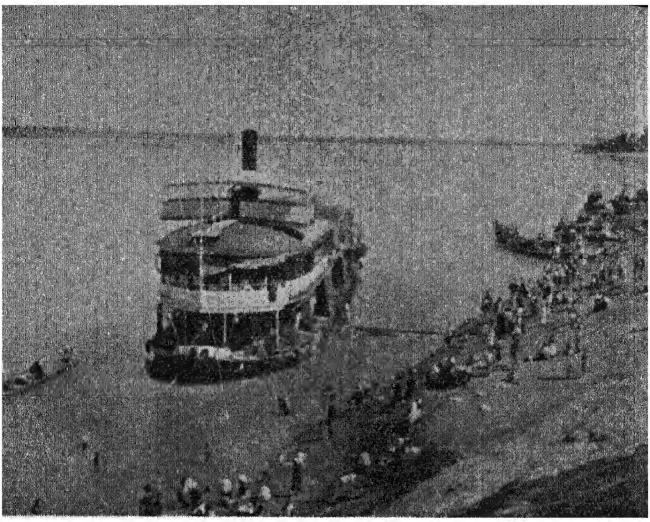
Myingyan is the river port for the Dry Zone east of the Irrawaddy, just as Pakokku is the river port for the Dry Zone west of the river.

Seikpyu is very like Kalewa, for here the route leading up the Yaw Valley into the Pakokku Hill Tracts meets the Irrawaddy.

Yenangyaung is the oil centre of Burma, and Chauk is the river port for the oilfield of Singu. Magwe and Minbu are on each side of the river, like Myingyan and Pakokku, and are river ports for the areas behind them. There are also Allanmyo and Thayetmyo.

Prome is the terminus of the railway from Rangoon and forms the junction between the river road and the rail road. It takes about five days for goods to reach Rangoon from Prome by river, but only about twelve hours by train, so that some goods are taken from the boats and put on the railway at Prome.

Henzada owes its importance to three things: (*a*) it is a 'ferry' town, i.e., where a road, the railroad,



[*Photo*: *L. D. Stamp*

**Fig. 244. A steamer of the Irrawaddy Flotilla on the River Chindwin**

crosses the river; (*b*) it is on the border between the Delta and the Lower Irrawaddy area; and (*c*) it is the most northerly part of the Delta itself.

(*d*) *The Delta.*—The roads of the Delta are the creeks. They connect the many mouths of the Irrawaddy, and by means of them the people of the Delta pass from place to place as easily as, and more cheaply than, the people of other parts of Burma get from village to village by cart. The 'river ports' of the Delta are situated on the larger streams and creeks, very often at places where two streams meet. The paddy of the Delta is brought to them to be sent to Rangoon in 'paddy gigs' or by river steamer, and they are also the market towns of the district. The chief are Bassein, Myaungmya, Maubin, Twante and

Pyapon. They are also important centres for the Delta fishing industry.

On the map of the communications of Burma (Fig. 245) are marked the principal rivers which can be used by the steamers. They are marked 'S'. The sign ⋎ S indicates the 'head of navigation', above which steamers cannot go. Then, acting as 'feeders' to these main streams there are the smaller rivers which can be used by country boats. They are marked 'C'. There are, of course, many other streams, but they are either too swift and rocky or too shallow for navigation. Notice on the map that some of the rivers are interrupted by rapids marked 'R'. At these points goods must be unloaded from the boats and carried overland to below the rapids.

There is another very important use to which the rivers of Burma are put, and that is for floating down the logs of timber from the forests. Very many of the small streams are used for this purpose during the rainy season, and there are three big rivers which are very valuable for this reason. They are the Sittang River, the Hlaing River, and the Salween. The Sittang River is dangerous to ships, because a great 'bore' or wave from the sea rushes up it, but the bore does not hurt the logs of timber. The logs are taken through the Pegu-Sittang Canal, and so reach the saw mills at Rangoon. The Hlaing River flows down the western side of the Pegu Yomas and passes into the Rangoon River itself. The timber floated down the Salween is exported from Moulmein.

2. **Canals.**—With two exceptions, the canals of Burma are not used as means of communication. They are for irrigation purposes only. The exceptions are: (*a*) the Twante Canal, twenty miles long, joining the Rangoon River with the Irrawaddy, and

(*b*) the Pegu-Sittang Canal, which joins the Pegu River with the River Sittang. The chief irrigation canals are the Mandalay Canal, the Shwebo Canal, the Yeu Canal, and three canals in the Minbu District—the Mon, Maw and Salin Canals. The water which is required to fill the irrigation canals is obtaind from the upper courses of swift rivers where they come down from the hills. If it were not for the canals most of this water, instead of forming a big river, would sink into the dry sandy soil of the Dry Belt.

In other countries swift streams and rivers are, as we say, 'harnessed', they are made to work machinery which produces electricity for factories. Perhaps one day some of the streams of Burma may be used in this way.

3. **Roads.**—There are now many metalled roads in Burma. Two lead out from Rangoon, to Prome and to Pegu, and on to Mandalay, and there are three or four more leading to hill-stations from the plains—from Mandalay to Maymyo, from Thazi to Taunggyi and on to Kengtung, from Thabeik-kyin to Mogok, and from Toungoo to Thandaung. A new road has now been constructed joining Mandalay with Chungking through the border town of Lashio, so that one can go now by road from Rangoon to Chungking, the present capital of China. Considerable quantities of merchandise and war material are at present being sent to China by this route.

There are a good number of 'unmetalled' roads, but as their surface is not hard, it quickly becomes full of ruts, and the roads cannot be used by any transport other than bullock carts; even they find it impossible to get along in the rainy season in many cases. The 'roads' in the hills are mere tracks, wide

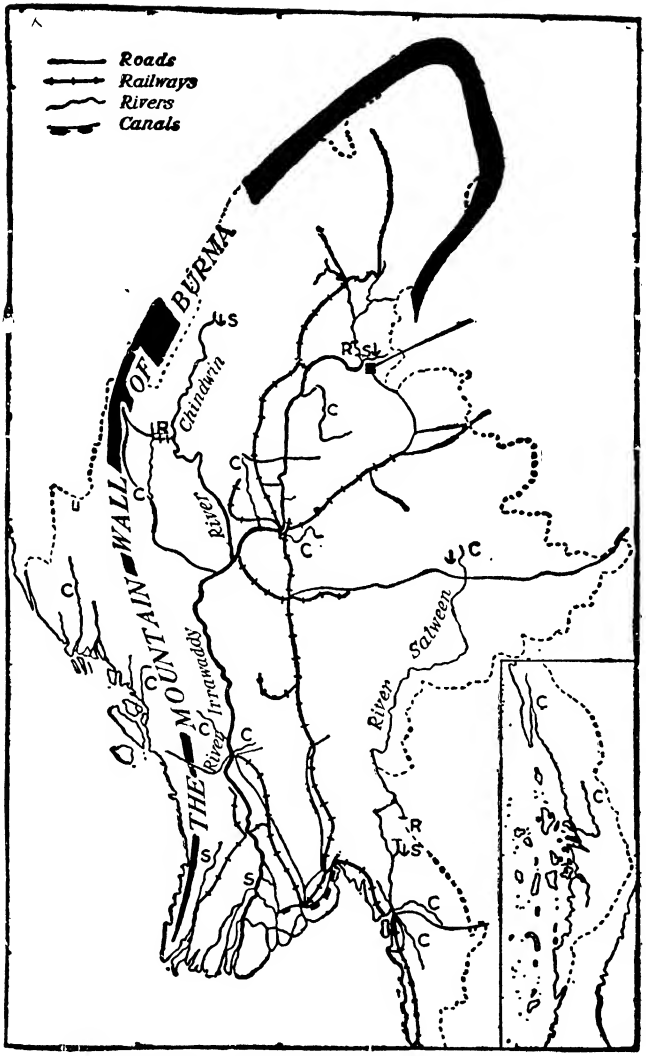



**Fig. 245. Communications of Burma**

enough only for pack mules and these again use them chiefly in the dry season.

4. **Railways.**—Fig. 245 shows that the river communications and the railways of Burma often follow the same lines. Railways nearly always follow river valleys, because it is cheaper to build a railway along more or less flat country than it is to carry it over ranges of hills where tunnels and bridges will be necessary.

The main line from Rangoon to Mandalay is 386 miles long, and follows the Sittang and Kyaukse River valleys. At Sagaing the line crosses the Irrawaddy by the new bridge, and continues up the Mu Valley to Wuntho and Katha and so on to Myitkyina, over 700 miles from Rangoon. A short branch from Sagaing follows the Chindwin Valley to Alôn and Ye-u. The line from Mandalay to Maymyo and Lashio follows the Myitnge Valley.

At Thazi, two branches leave the main line, one going west to Meiktila and Myingyan, and one going to the Shan Plateau through Kalaw to Shweyaung. It will be continued towards Taunggyi in time to come.

The line from Rangoon to Prome is 160 miles long, and at Letpadan there is a branch to Tharrawaw, where a steam ferry takes passengers and goods across the Irrawaddy to Henzada, from which place there are two branches to Bassein and to Kyangin respectively.

The railways of Burma are 'metre gauge'. The mail leaves Rangoon at noon and arrives in Mandalay at six the next morning. That is, it takes eighteen hours to do 386 miles. In England a fast express, leaving London at 2 p.m., can reach Edinburgh, 375 miles away, in six hours.

## QUESTIONS AND EXERCISES

1. Why are more roads needed in Burma? Where do you think they ought to be made?

2. How would a man travel from Bhamo to Calcutta? Why would he travel the way you suggest?

3. If on an average you can travel 400 miles a day by train, 200 miles a day by motor car, fifty by steamer, and fifteen by bullock cart, how long would it take you to reach the following places from Rangoon, and how would you go: Pakokku, Homalin, Bhamo, Yenangyaung, Myitkyina, Taunggyi and Mogok?

4. Why should people living in the Dry Belt want to exchange goods with those living in the Deltas? Explain by sketch-maps how the exchange takes place.

5. Is there any reason for the direction followed by the railways from Rangoon?

6. The trade along the river between Bhamo and Mandalay is much more important than that between Kindat and Sagaing. Give reasons for this.

7. Draw a diagram to explain the advantages of the position of Henzada.

# CHAPTER XLVI

## FOREIGN TRADE OF BURMA

**Rangoon.**—Burma is surrounded by a mountain wall, and all the area inside the wall forms the hinterland of Rangoon. The other ports of Burma are Akyab (the port of the Arakan Coastal Strip) and Moulmein (the principal port of Tenasserim). Fig. 246 shows their relative importance.

The following are the exports of Burma (see Fig. 247):—

*Rice.*—By far the most important is *rice*. The quantity is fairly constant, 2½ million tons every

**Fig. 246. Trade of the sea ports of Burma with total overland trade for comparison**

year. Those countries which have had a bad harvest of their own, are usually the biggest buyers—sometimes it is India, sometimes Japan or China.

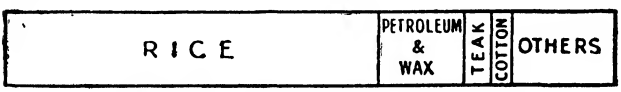



**Fig. 247. The Exports of Rangoon**

The chief customers in the Empire are India, Ceylon, Straits Settlements, Egypt, Hongkong and the United Kingdom. Of the foreign countries Germany is the chief, followed by China.

*Petroleum and its Products.*—Petroleum, paraffin wax and candles are exported. Nearly all the oil goes to India, which has very little of its own, but the candles go to Europe and Egypt.

*Teakwood.*—Most of the teak exported goes to India, the remainder to other parts of the British Empire and foreign countries.

*Other Products.*—Cotton is exported mainly to the far Eastern countries. Other exports are *hides* and *skins, beans, rubber, lac, metals* and *ores* and *jadestone.*

About one-third of the exports of Burma go to India.

The imports of Burma are very similar to those of India, except that there is a large trade with India proper (Fig. 248).

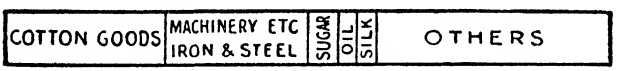



**Fig. 248. The Imports of Rangoon**

*Cotton Goods for Clothing, etc.*—These are by far the most important. About four-fifths come from India and the United Kingdom, and the remainder mainly from Japan and the Netherlands.

*Machinery.*—The United Kingdom supplies the bulk of this, the other contributors being Germany and the United States.

*Coal.*—Burma imports several hundred thousand tons of Bengal coal every year.

*Other Imports.*—Silk, sugar, tobacco and liquors. Nearly half the imports of Burma come from India.

**Overland Trade of Burma.**—Fig. 246 shows the small value of the overland trade when compared with the sea-borne trade. It is mainly with China (through Bhamo and Kunlong Ferry) and Siam (*via* Tavoy).

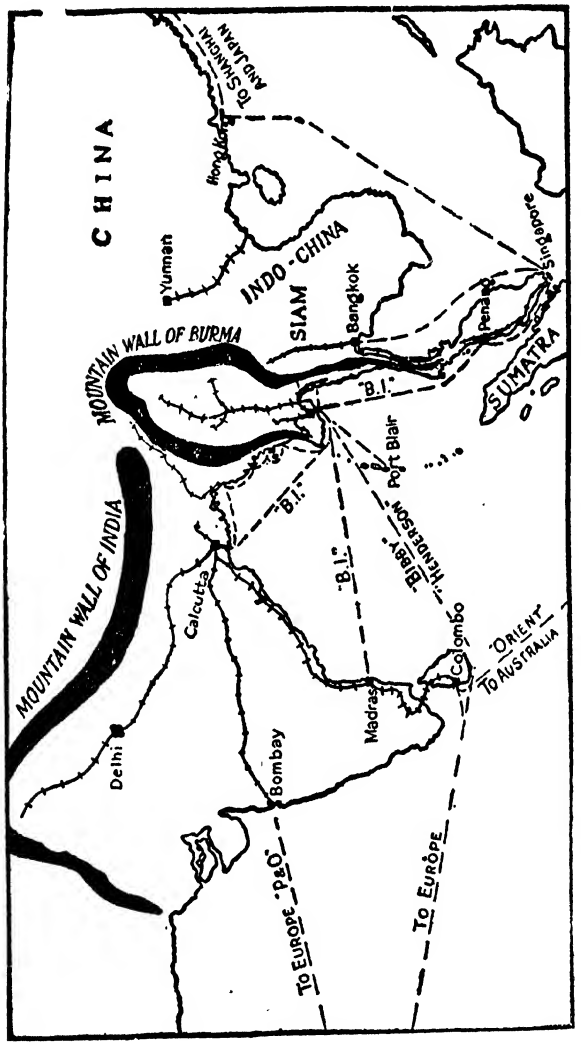



Fig. 249. Trade and Steamship routes to Burma

**Air Routes to Burma.**—Burma is now well served by air routes. British, French and Dutch planes call regularly at Rangoon. The main routes are across the Arakan Yomas to Akyab and Calcutta and so to Europe and, in the other directions to Bangkok, Singapore and Australia. Local services are run in Burma from Rangoon to Yenangyaung and Rangoon to Tavoy.

# CHAPTER XLVII

## CEYLON

1. **Position.**—Ceylon is a large island situated to the south of the Peninsular India. It must once have been joined to India and in many ways it is very similar. Ceylon is shaped like a pear and is a little smaller than the State of Mysore, its area being about 25,000 square miles. The distance from north to south is 270 miles.

2. **Physical Features and Geology.**—In its physical features Ceylon is very simple. It consists of a central mass of mountains, surrounded by a broad—generally rolling—coastal plain. Many of the central mountains are high, the highest is more than 8,000 feet. In the north the coastal plain is quite flat and there are several sandy peninsulas. The end of the Mannar Peninsula is only 22 miles from the nearest point of India (Dhanushkodi). Ceylon is very nearly joined to India between these two points by a line of sand banks and rocks called Adam's Bridge.

The mountains of Ceylon consist of the same old, hard crystalline rocks as the Deccan. These same rocks underlie the coastal plain, but there they have been covered by a thick coat of *laterite*. Laterite is a rock which is formed in hot, wet countries by rain acting on other rocks. The old crystalline rocks at the surface have been completely changed by the action of the rain water and turned into a much softer, red or brown rock, full of holes. In the north of the island the old rocks have been covered by soft limestone. Round the island there are many sand

dunes and between the sand dunes and the main mass of the land are many lagoons. The old, crystalline rocks of Ceylon are noted for their beautiful gemstones and for the mineral graphite from which 'lead' pencils are made.

3. **Climate.**—Ceylon is nearer the equator than any part of India and so is hot all the year round. The presence of the sea keeps the climate equable and everywhere along the coast land and sea breezes are felt. There is very little difference between the temperature of day and night—that is, the 'daily range' is very small. At Colombo it is only 12°. The annual range is also very small. January is the coldest month (80°) and May the hottest but at Colombo there is only a difference of 5° between the two. Compare the temperature graph for Trivandrum in Chapter IV.

The western coast of southern India gets a heavy rainfall from the South-West Monsoon, whilst the eastern coast gets much of its rain in the months of November and December when the North-East Monsoon has begun to blow. Ceylon gets its rain from both monsoons. There is a heavy rainfall on the west and south-west coasts and the mountains from the South-West Monsoon. There is a heavy rainfall on the north-east coast and eastern slopes of the mountains later in the year from the North-East Monsoon. The northern part of the island has no hills to intercept the winds and is a dry region. So also is the south-eastern part of the island. Thus although Ceylon is not a very large island its climate varies considerably.

4. **Vegetation.**—Just as the climate of Ceylon varies a great deal, so does the natural vegetation vary greatly from one part of the island to another. The

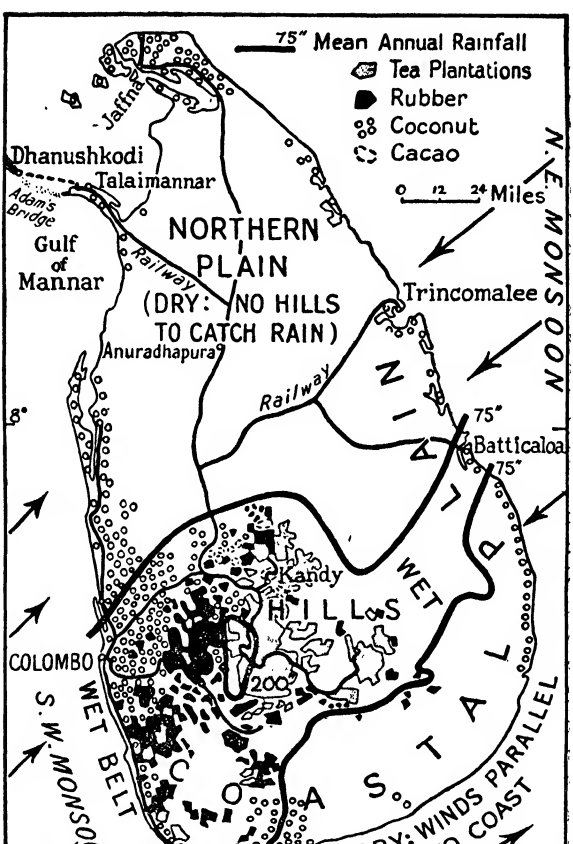



**Fig. 250. Ceylon—General Map**

Notice how nearly all the cultivation is on the wet, south-western side of the hill country.

lower slopes of the mountains used to be covered with thick evergreen forest. Now most of these forests have been cleared away to make room for rubber plantations and tea gardens and there is little timber of value left. The wetter parts of the lowlands were also covered with wet evergreen forests and the drier parts with scrub forests. A great part of the wetter land is now used for rice and coconuts but the drier parts are still untouched.

Taking the whole of Ceylon, about two-fifths is cultivated. Thick forest covers about one-fifth of the area and there is a large amount still covered by waste land which might be used.

5. **Population.**—There are nearly 5½ million people in Ceylon. The principal race is the Sinhalese or Ceylonese who, between 2,000 and 3,000 years ago, came from the north of India and conquered Ceylon. The Sinhalese are Buddhists by religion, or followers of the Great Teacher Buddha. At Kandy is the Temple of the Tooth, where a tooth of Buddha is preserved. It is one of the most sacred places in the world to Buddhists. The north of Ceylon is inhabited mainly by Tamils, who are Hindus by religion, and who came over from India either as conquerors in past ages, or more recently as labourers in the tea gardens, coffee and rubber estates. The moors are Muslim traders, boatmen or fishermen who came originally from North Africa. The descendants of the old Portuguese and Dutch settlers are called Burghers. In the wilder parts of the mountains, there are still a few Veddas, a very primitive hill tribe. The people live mainly on the wetter parts of the plain and in the hills. On the dry, unfertile soils of the northern regions and the east there are very few people.

6. **Government.**—Ceylon is entirely separated from

India in matters of Government. The first Europeans to settle in the Island were the Portuguese in 1505; followed by the Dutch and later by the English. The old Dutch ports are still to be seen at Galle and other places. Ceylon was separated from the Presidency of Madras in 1802 and made a Crown Colony and so became a separate country of the British Commonwealth. Since January 1948 it is a Dominion with a Governor-General, a Council of Ministers and a State Council elected by the people.

# CHAPTER XLVIII

## CEYLON—NATURAL REGIONS

1. **Natural Regions.**—Ceylon, though only a small country, must be divided into at least three natural regions:—

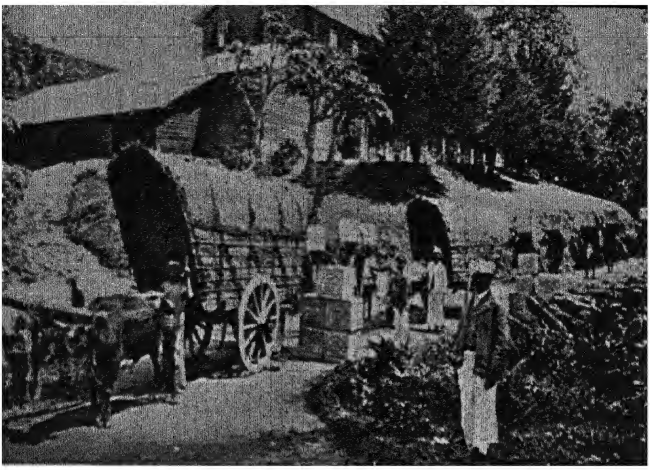
(*a*) The Hill Country, comprising the central mountain mass of the island, roughly the land over 1,000 feet.

(*b*) The Maritime Belt or Coastal Plain of the east, south and west.

(*c*) The Northern Limestone Plain, occupying the northen end of the island.

2. **The Hill Country.**[1]—This natural region is formed by the mountainous centre of the island. It consists of a series of ridges, separated by deep valleys, running roughly from north-east to south-west. Very little is now left of the vast forests which covered this region before the days of European planting. The trees are nearly all evergreen and get smaller the higher one goes, so that above 5,000 feet the trees are too small to be useful as timber. At intervals there are broad, marshy or grassy plains, like that of Nuwara Eliya and the Horton Plains, surrounded by mountains. The rainfall of most of the region is heavy; the rain does not fall so heavily as on the plains but is more continuous and for days or even weeks together the sun may be hidden by dense clouds of mist. The greater part of the rain falls during the South-West Monsoon, from June to October. Many

[1] Comprising the Central Province, Province of Sabaragamuwa and the western hilly parts of the Province of Uva.



[*Photo*: *Platé Ltd.*

**Fig. 251. A Tea Factory in Ceylon**

Showing also the typical bullock carts, built to protect the goods carried from heavy rain.

of the rubber plantations are found in this region, especially on the western side, as well as nearly all the tea gardens. The latter are the most numerous between Kandy and Nuwara Eliya. North and north-east of Kandy the cocoa tree is grown, from which cocoa is obtained. Many of the valley sides are steep, but are very carefully terraced for the growing of paddy. A large amount of coffee used to be grown in Ceylon but, as in South India, it is no longer important.

The old hard rocks which make up the mountain country are famous for gemstones—sapphires, spinels, moonstones, etc. There are hundreds of small gem quarries, especially where the gems have been washed out of the old rocks and into the gravels of the valleys, as round Ratnapura. Another important mineral is graphite, used for making lead pencils. The most important mines are in the Kurunegala District.

*Kandy*, the old capital, is in this region and is reached by a wonderful hill railway from Colombo, seventy-two miles away. *Nuwara Eliya* is a well-known hill station.

3. **The Maritime Belt or Coastal Plain.**[1]—All round the mountainous centre of Ceylon there is a broad belt less than 1,000 feet above sea level. Over this stretch the old hard rocks are hidden by a deep red soil of laterite. All along the coast, thrown up by wind and waves there are lines of sand dunes; just as on the west coast of India, large brackish lagoons are found behind the sandy ridges. The climate of the maritime belt varies greatly. The western and south-western sides get a heavy rainfall from the South-West Monsoon, the south-eastern side is dry, whilst the eastern side is again wetter, receiving its rain largely in November and December from the North-East Monsoon. The wet low country is thickly populated and widely cultivated, especially on the west and south-west of the island. The level lands and the valleys are occupied by rice fields, yielding two crops a year, one after each monsoon (see Fig. 67). The higher lands towards the hills are covered by the mixed tree cultivation of the Sinhalese. Each farmer has coconuts, arecanuts, mangoes, jacks or breadfruit together with yams, and small plants like pepper. On the borders of hill country are rubber and tea plantations. All along the coast are groves of coconuts. The husks are allowed to soak and rot in the shallow lagoons and so the fibre (coir) is obtained. Industries connected with the coconut find employment for large numbers of people. The kernels are roughly dried

[1] Comprising the Eastern Province, Southern Province, Western Province, most of the North-West Province and part of the North Central.

for export as copra; even more important is the export of carefully dried or 'desiccated coconut' prepared in factories; there are also factories for the preparation of coconut oil. The preparation of coir is mainly a village industry. Arecanuts are also grown for export. Of these spices for which Ceylon has long been famous, cinnamon is the most important. The cinnamon tree likes a very light sandy soil and grows in those parts of the maritime belt where such a soil is

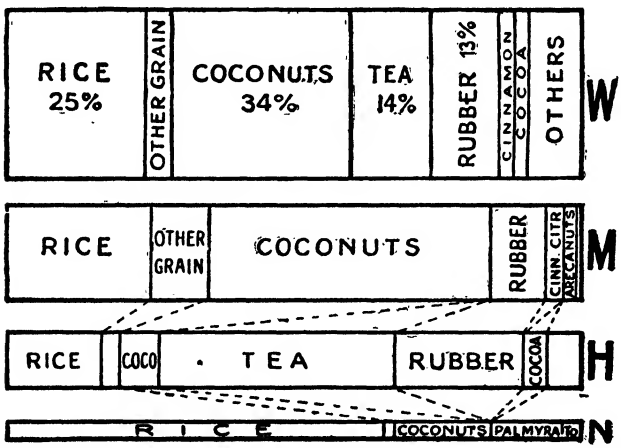



**Fig. 252. The crops of Ceylon and of its natural regions**

The top diagram (W) shows the crops of the whole island; the next those of the Maritime Region (M); the next those of the Hills Region (H); and the bottom one those of the Northern Region (N).

found. The industry is less important than formerly. The cinnamon of commerce is obtained from the inner bark of young shoots. Other spices are cardamoms, cloves, etc. Citronella oil, prepared from a grass, is obtained mainly in the south-west of the island. The parts of the maritime belt away from roads and railways, especially in the dry parts of the

south-east and in the east are thinly populated and there is much waste land. A railway has now been completed across the island to Trincomalee, and should do much to open up the country. There is a branch to Batticaloa.

Round the coast fishing is an important industry. The boats of the fishermen are made either of stems of palm trees or planks of wood and are very narrow. They would roll over in the water but they have a log of wood on one side which forms a float. The float is not tied close to the boat itself, but six to twelve feet away, so that the boat is really like two boats joined together by two cross poles, but one of the boats is only a log of wood.

The capital of Ceylon, *Colombo*, is on the west coast. There is a bend on the coast which partly sheltered a small harbour from the force of the South-West Monsoon. Now a fine breakwater encloses an artificial harbour (Fig. 253) and Colombo is not only the principal port of Ceylon but is situated on a great ocean highway from Europe to the Far East. Colombo is a sea junction—like a railway junction but on the sea routes of the world—for here the main trade route goes on to Singapore and China, but there are branches from Colombo to Madras and Calcutta, to Rangoon and an important one to Australia. This is shown in Fig. 205.

Before the harbour of Colombo was finished, *Galle* used to be the principal port of call. It has a pretty natural harbour, but one with a dangerous rocky entrance. The entrance is guarded by an old Dutch fort.

*Trincomalee*, on the north-east coast, has a fine large natural harbour, but its hinterland is not important and there is not much trade. But Trincomalee has now been made an important naval station.

**4. The Northern Limestone Plain.**—Covering the whole of the north of Ceylon is a broad plain, which does not rise more than 200 or 300 feet above sea-level. The northern part of this plain is formed by a pale limestone, sometimes covered by a thin, bright red soil. Round the coast are sand dunes. Most of this region gets about 40 inches of rain, but the soil is dry and poor and there is much waste land covered with scrub jungle. The palmyra palm flourishes in this northern region. Cultivation is protected by numerous 'tanks', mostly very old. *Jaffna*, situated on the Jaffna Peninsula, is the most important town in this natural region. At the end of the Peninsula of Mannar is Talaimannar, the terminus of the Ceylon Government Railways, where steamers run daily to Dhanushkodi, twenty-two miles away, the terminus of the South Indian Railway. South of the Mannar Peninsula is an area of shallow sea (the Gulf of Mannar) famous for its pearl fisheries. This region used to have many more people than it does now. Large numbers have died from malaria and many of the tanks have fallen into disuse. In this northern region is the famous old capital city of Anuradhapura with its many ruined temples.

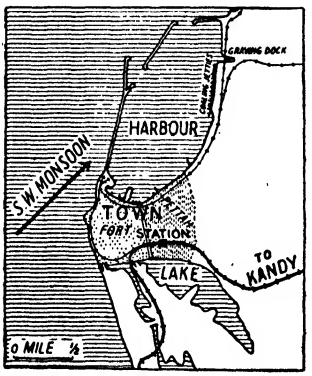



**Fig. 253. Sketch-map of the artificial harbour of Colombo**

Showing how it is protected from the South-West Monsoon.

# CHAPTER XLIX

## CEYLON—COMMUNICATIONS AND TRADE

1. **Communications of Ceylon.**—Colombo is the centre of the (broad gauge) Ceylon Government Railways. One line runs southwards along the coast to Galle and Matara, whilst the main line runs north-eastwards through the old historical town of Anuradhapura to Jaffna, with a branch to Talaimannar. Another line runs from Colombo up to Kandy and winds amongst the hilly country to Badulla, with a small branch to Nuwara Eliya. There are numerous excellent roads in Ceylon which link up outlying places with the railways.

2. **The Trade of Ceylon.**—The total value of the trade of Ceylon is very roughly one-eighth of that of India. By far the most important port is Colombo, with a fine artificial harbour. Its trade is roughly equal to that of Rangoon or Karachi, but is a busier harbour because it is the port of call for liners to the Far East and to Australia. In addition to the real trade of Colombo there is a large amount of transhipment trade—goods are taken from one vessel, stored for a short while before being *transhipped* to another vessel going to the right destination. It is like an 'ocean junction' where passengers (and goods) travelling by one line change on to another. The other ports of Ceylon are Galle, Talaimannar (for India), Trincomalee and Jaffna. Fig. 254 shows the exports of Ceylon.

*Tea,* of which a large part goes to Great Britain, forms nearly half of the whole export trade.

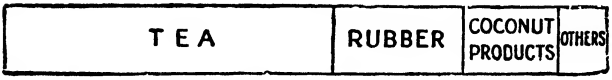



**Fig. 254. The Exports of Ceylon**

*Rubber* goes mainly to Great Britain and the United States.

*Coconuts, coconut oil* and *copra* go very largely to the United Kingdom.

*Other exports* (much less important) are arecanuts, cocoa, cinnamon, citronella oil and plumbago.

Fig. 255 shows the imports of Ceylon.

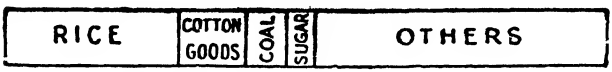



**Fig. 255. The Imports of Ceylon**

*Rice* is very important. The mountainous island of Ceylon cannot grow enough to feed the population.

*Cotton goods* are next in importance.

*Coal* and *Coke* of which Ceylon has none at all, come next.

3. **The Maldive Islands.**—The Maldive Islands are a group of coral islands 400 miles south-west of Ceylon. There are about 70,000 inhabitants who are Muslims and ruled by a Sultan. More than half the people are fishermen, and the inhabitants are great traders. The islands are clothed with coconut palms, and very fine quality coir is produced and exported, mainly to India. Further north are the Laccadive Islands.

## QUESTIONS AND EXERCISES

1. Compare and contrast the Maritime Region of Ceylon with (*a*) the West Coast of India, and (*b*) the Carnatic Region.
2. What possibilities do you think exist for future development in Ceylon? Explain fully.
3. Colombo and Bombay are both very important ports. Compare and contrast them with regard to position, character and trade.
4. What is copra? Give an account, with sketch-maps, of the copra industry of India and Ceylon.
5. Write an essay on tea.
6. What do you know of the coffee industry of India and Ceylon?
7. Give an account of the products of Ceylon.

# APPENDIX

## USEFUL TABLES

These tables are added with the object of providing the teacher with material for further practical exercises. On no account are they to be memorized merely as facts. The teacher should use his ingenuity to invent exercises and problems upon them, for his pupils to work individually. The ability to work problems of this type is the surest proof that students have really grasped the subject intelligently.

Throughout this book, treatment has been by Natural Regions. In many of the tables which follow, the figures are given for the different Provinces, so that the pupils may work exercises, taking the Province in which they live as a whole.

Exercises should be of the following type:—

1. Fill up the blanks in the tables.

2. Represent areas, populations, products and trade graphically on squared paper, and make comparisons between Provinces or Regions.

3. Draw diagrams for temperature and rainfall like those shown in the book. Explain all differences and make comparisons.

4. Make up and work arithmetical problems on the tables.

5. Take each table separately, turn it into a diagram, then write a composition on all that it teaches.

6. Draw little Sketch-maps illustrating facts shewn in the tables, especially Table VI.

## TABLE I

### Sizes and Areas

The Earth: Area 197,000,000 sq. miles. Land 57,500,000 sq. miles Water 139,500,000 sq. miles.

| — | Area (sq. miles) | Coastline (miles) |
|---|---|---|
| Europe ... .. | 3,760,000 | 23,100 |
| Asia ... ... ... | 17,040,000 | 43,900 |
| Africa ... ... | 11,280,000 | 19,000 |
| North America ... .. | 7,950,000 | 46,600 |
| South America ... ... | 6,850,000 | 17,800 |
| Australia ... ... | 2 980,000 | 12,100 |

| — | Area (sq. miles) | Population 1931 | Density |
|---|---|---|---|
| Great Britain | 120,879 | 49,161,437 | |
| England ... ... | 50,874 | 37,789,738 | |
| Wales ... ... | 7,466 | 2,158,193 | |
| Scotland ... ... | 30,405 | 4,842,554 | |
| North Ireland ... | 5,237 | 1,256,561 | |
| Irish Free State ... | 26,601 | 2,971,992 | |
| India Including Burma | 1,808,679 | 352,837,778 | |
| *Provinces* | 1,096,171 | 271,526,933 | |
| Ajmer-Merwara ... | 2,711 | 560,292 | |
| Andamans ... | 3,143 | 29,463 | |
| Assam ... ... | 55,014 | 8,622,251 | |
| Baluchistan ... | 54,228 | 463,508 | |
| Bengal ... ... | 77,521 | 50,114,002 | |
| Bihar and Orissa ... | 83,054 | 37,677,576 | |
| Bombay Presidency ... | 123,679 | 21,930,601 | |
| Burma ... ... | 233,492 | 14,667,146 | |
| Central Provinces ... | 99,920 | 15,507,723 | |
| Coorg ... ... | 1,593 | 163,327 | |
| Delhi ... ... | 573 | 636,246 | |
| Madras ... ... | 142,277 | 46,740,107 | |
| N. W. F. P. ... | 13,518 | 2,425,076 | |
| Punjab ... ... | 99,200 | 23,580,852 | |
| United Provinces ... | 106,248 | 48,408,763 | |
| *States and Agencies* ... | 712,508 | 81,310,845 | |
| Assam ... ... | 12,320 | 625,606 | |
| Baluchistan ... | 80,410 | 405,109 | |
| Baroda ... ... | 8,164 | 2,443,007 | |

TABLE I—(*continued*)

SIZES AND AREAS—(*continued*)

| —— | Area (sq. miles) | Population 1931 | Density |
|---|---|---|---|
| *States and Agencies* (contd.) | | | |
| Bengal ... ... | 5,434 | 973,336 | |
| Bihar and Orissa ... | 28,648 | 4,652,007 | |
| Bombay ... ... | 27,994 | 4,468,396 | |
| Central India ... | 51,597 | 6,632,790 | |
| C. P. States ... | 31,175 | 2,483,214 | |
| Gwalior ... ... | 26,367 | 3,523,070 | |
| Hyderabad ... | 82,698 | 14,436,148 | |
| Kashmir and Jammu ... | 84,516 | 3,646,243 | |
| Madras States ... | 10,698 | 6,754,484 | |
| Mysore ... ... | 29,326 | 6,557,302 | |
| N.-W. F. P. States ... | 22,838 | 2,259,288 | |
| Punjab States ... | 5,820 | 437,787 | |
| Rajputana ... | 31,241 | 4,472,218 | |
| Sikkim ... ... | 129,059 | 11,225,712 | |
| U. P. States ... | 2,818 | 109,808 | |
| Manipur ... ... | 5,943 | 1,206,070 | |
| W. Ind. States Agency. | 35,442 | 3,999,250 | |
| Ceylon ... ... | 25,332 | 5,306,863 | |
| Afghanistan ... ... | c. 250,000 | c. 11,000,000 | |
| China (including Manchuria) ... ... | 4,278,352 | 474,787,386 | |
| Japan (Empire) ... | 260,644 | 90,396,043 | |
| ,, Proper ... ... | 147,593 | 64,450,005 | |
| Siam ... ... | 200,234 | c. 11,684,000 | |

## TABLE II

The sky is divided into ten divisions, and the number of divisions covered by cloud is shown in this table.

| Place | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sep. | Oct. | Nov. | Dec. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bombay ... ... | 1·3 | 1·3 | 1·8 | 3·1 | 4·0 | 7·6 | 8·9 | 8·9 | 7·3 | 3·6 | 1·7 | 1·7 | 4·3 |
| Nagpur ... ... | 1·8 | 2·1 | 1·8 | 2·3 | 2·3 | 6·1 | 8·2 | 8·2 | 6·1 | 2·8 | 1·7 | 2·1 | 3·8 |
| Hyderabad ... ... | 2·1 | 1·8 | 1·4 | 2·2 | 3·3 | 6·6 | 7·8 | 7·4 | 6·3 | 3·9 | 2·6 | 2·0 | 3·9 |
| Madras ... ... | 3·3 | 2·8 | 2·4 | 4·3 | 4·0 | 6·0 | 7·1 | 6·8 | 6·3 | 5·3 | 5·4 | 4·9 | 4·9 |
| Neemuch ... ... | 1·7 | 1·8 | 1·7 | 1·4 | 0·9 | 4·0 | 7·1 | 7·2 | 4·0 | 1·3 | 0·9 | 1·5 | 2·8 |
| Mercara ... ... | 4·1 | 3·5 | 3·2 | 4·5 | 6·3 | 8·8 | 9·6 | 9·4 | 8·5 | 6·6 | 5·5 | 5·0 | 6·3 |
| Karachi ... ... | 2·5 | 2·3 | 2·3 | 2·4 | 3·2 | 5·4 | 7·2 | 7·5 | 4·8 | 1·6 | 1·2 | 1·9 | 3·5 |
| Lahore ... ... | 3·7 | 3·6 | 3·6 | 2·6 | 1·6 | 2·4 | 3·8 | 3·8 | 1·6 | 0·5 | 1·2 | 2·6 | 2·6 |
| Quetta ... ... | 3·8 | 3·7 | 3·3 | 2·4 | 1·0 | 0·6 | 1·1 | 1·1 | 0·3 | 0·3 | 1·7 | 3·1 | 1·9 |

## TABLE III

TEMPERATURES (not reduced to sea-level) and RAINFALL

| Station | Month | Max. | Min. | Average | Rain Inches | Station | Month | Max. | Min. | Average | Rain Inches |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dharwar (West Coast Region.) | Jan. | 86·4 | 65·8 | | 0·06 | Bellary (Deecan Region.) | Jan. | 88·2 | 61·6 | | 0·08 |
| | Feb. | 86·0 | 67·0 | | 0·01 | | Feb. | 94·2 | 65·9 | | 0·07 |
| | Mar. | 87·5 | 72·4 | | ... | | Mar. | 100·5 | 72·2 | | 0·21 |
| | Apr. | 89·5 | 77·5 | | 0·51 | | Apr. | 103·6 | 77·2 | | 0·86 |
| | May | 89·7 | 79·7 | | 3·08 | | May | 102·5 | 77·6 | | 1·91 |
| | June | 85·2 | 76·2 | | 37·30 | | June | 94·8 | 75·8 | | 2·16 |
| | July | 82·9 | 75·2 | | 39·12 | | July | 91·0 | 75·0 | | 1 62 |
| | Aug. | 82·4 | 74·7 | | 20·59 | | Aug. | 91 8 | 73·8 | | 2·17 |
| | Sep. | 82·6 | 74·0 | | 10·58 | | Sep. | 90·6 | 72·9 | | 4·61 |
| | Oct. | 85·4 | 73·6 | | 5·43 | | Oct. | 90·3 | 71·2 | | 4·08 |
| | Nov. | 87·6 | 69·5 | | 1·47 | | Nov. | 87·4 | 65·0 | | 1·73 |
| | Dec. | 87·6 | 66·4 | | 0·21 | | Dec. | 85·9 | 61·3 | | 0·09 |
| Negapatam (Carnatic Region.) | Jan. | 82·4 | 71·4 | | 1·54 | Poona (Deccan Lavas Region.) | Jan. | 86 2 | 54·2 | | 0·09 |
| | Feb. | 84·8 | 72·7 | | 0·91 | | Feb. | 90·9 | 56·2 | | 0·03 |
| | Mar. | 88·8 | 75·9 | | 0·34 | | Mar. | 97·5 | 63·2 | | 0·94 |
| | Apr. | 92·7 | 79·3 | | 0·80 | | Apr. | 101·4 | 69·2 | | 0·66 |
| | May | 97·6 | 80·2 | | 1·99 | | May | 99·7 | 71·8 | | 1·28 |
| | June | 97·6 | 79·4 | | 1·46 | | June | 89 8 | 72·6 | | 5·67 |
| | July | 95·9 | 78·4 | | 1·85 | | July | 82·5 | 70·9 | | 7 67 |
| | Aug. | 93·9 | 77·3 | | 3·54 | | Aug. | 81·7 | 69·6 | | 3·77 |
| | Sep. | 92·7 | 76·7 | | 3·75 | | Sep. | 84·4 | 68·6 | | 4·70 |
| | Oct. | 88·7 | 76·2 | | 10 53 | | Oct. | 89·0 | 66·4 | | 4·04 |
| | Nov. | 84·5 | 74·3 | | 15·70 | | Nov. | 86·7 | 58·8 | | 0·99 |
| | Dec. | 82·1 | 72·1 | | 11·21 | | Dec. | 84·6 | 53·8 | | 0·25 |
| Mercara (Border of West Coast and Deccan Regions- Crest of Western Ghats.) | Jan. | 77·8 | 57·0 | | 0·18 | Singapore | Jan. | 89·3 | 73·0 | | |
| | Feb. | 81·2 | 58·9 | | 0·16 | | Feb. | 89·8 | 72·4 | | |
| | Mar. | 84·6 | 61·6 | | 0·66 | | Mar. | 91·5 | 73·3 | | |
| | Apr. | 84·0 | 63·9 | | 2·69 | | Apr. | 91·0 | 74·6 | | |
| | May | 80·4 | 64·5 | | 5·38 | | May | 90 7 | 75 1 | | |
| | June | 72·8 | 63·4 | | 26·50 | | June | 90·0 | 74·8 | | |
| | July | 69·0 | 62·2 | | 43·71 | | July | 89·6 | 74·5 | | |
| | Aug. | 69·7 | 62·1 | | 26·01 | | Aug. | 88·9 | 73 6 | | |
| | Sep. | 71·8 | 61·8 | | 10·71 | | Sep. | 88·4 | 74·0 | | |
| | Oct. | 76·0 | 62·1 | | 8·77 | | Oct. | 88·4 | 74·0 | | |
| | Nov. | 76·0 | 60·2 | | 2·82 | | Nov. | 87·5 | 73·5 | | |
| | Dec. | 75·5 | 57·7 | | 0·75 | | Dec. | 87·9 | 72·6 | | |
| Kalat (Baluchistan.) | Jan. | 50·7 | 21·5 | | 1·65 | Colombo | Jan. | 87·6 | 72·2 | | 3·29 |
| | Feb. | 53·2 | 23·6 | | 1·83 | | Feb. | 88·6 | 73·0 | | 1·83 |
| | Mar. | 63·4 | 32·3 | | 1·29 | | Mar. | 89·7 | 75·0 | | 4·14 |
| | Apr. | 74·2 | 36·8 | | 1·57 | | Apr. | 89·3 | 76·2 | | 7·07 |
| | May | 83 6 | 42·6 | | 0·22 | | May | 88·1 | 78·1 | | 13·13 |
| | June | 91·2 | 47·9 | | 0·22 | | June | 86·1 | 77·5 | | 7·31 |
| | July | 93·2 | 53·3 | | 0·56 | | July | 85·6 | 77·1 | | 6·11 |
| | Aug. | 91·3 | 49·2 | | 0·45 | | Aug. | 86·0 | 77·4 | | 2·78 |
| | Sep. | 85·4 | 38·4 | | 0·03 | | Sep. | 86·3 | 77·1 | | 5·56 |
| | Oct. | 74·5 | 30·0 | | 0·16 | | Oct. | 86·0 | 75·3 | | 13·34 |
| | Nov. | 67·2 | 27·1 | | 0·51 | | Nov. | 86·6 | 74·1 | | 10·77 |
| | Dec. | 57·7 | 24·1 | | 0·85 | | Dec. | 86·9 | 72·9 | | 4·71 |

AVERAGE TEMPERATURE OF LONDON

| | °F | | °F | | °F | | °F |
|---|---|---|---|---|---|---|---|
| Jan. | ... 38 | Apr | ... 49 | July | ... 64 | Oct. | ... 50 |
| Feb. | ... 40 | May | ... 55 | Aug. | ... 63 | Nov. | ... 44 |
| Mar. | ... 43 | June | 61 | Sep. | 58 | Dec. | ... 40 |

## TABLE IV

CULTIVATION (in thousands of acres) in 1930–1

| Province | Forest | Not available for cultivation | Waste: good land but not used | Cultivated and fallow | Irrigated |
|---|---|---|---|---|---|
| Madras ... ... ... | 13,370 | 20,186 | 12,919 | 44,549 | 11,325 |
| Bombay ... ... ... | 9,117 | 19,850 | 6,786 | 43,128 | 4,501 |
| Sind ... ... ... | 601 | 8,773 | 3,753 | 5,813 | 2,240 |
| Bengal ... ... ... | 4,594 | 9,587 | 5,941 | 29,034 | 1,735 |
| United Provinces ... ... | 9,268 | 9,940 | 10,647 | 38,138 | 11,216 |
| Punjab ... ... ... | 1,966 | 12,713 | 14,826 | 30,674 | 15,071 |
| Burma ... ... .. | 21,249 | 52,993 | 59,789 | 21,818 | 1,513 |
| Bihar and Orissa ... ... | 7,340 | 8,116 | 6,891 | 30,825 | 5,345 |
| Central Provinces and Berar ... } ... | 16,372 | 4,940 | 14,160 | 28,713 | 1,130 |
| Assam ... ... ... | 3,853 | 4,571 | 18,947 | 7,929 | 579 |
| N.-W.F.P. ... ... ... | 358 | 2,632 | 2,691 | 2,884 | 973 |
| Ajmer-Merwara ... ... | 100 | 166 | 308 | 500 | 140 |
| Coorg ... ... ... | 357 | 334 | 12 | 309 | 4 |
| Delhi ... ... ... | ... | 81 | 64 | 225 | 67 |

## TABLE V

### Live Stock, etc. (1930-1)

| Province | Oxen | Buffaloes | Sheep | Goats | Horses | Mules and Donkeys | Camels | Ploughs | Carts |
|---|---|---|---|---|---|---|---|---|---|
| Assam ... | 3,656,000 | 565,000 | 46,000 | 698,000 | 23,000 | ... | ... | 1,167,000 | 77,000 |
| Bengal ... | 24,236,000 | 1,088,000 | 614,000 | 5,435,000 | 113,000 | 2,000 | ... | 4,592,000 | 860,000 |
| Madras ... | 16,447,000 | 5,993,000 | 12,864,000 | 7,406,000 | 39,000 | 131,000 | ... | 4,476,000 | 1,235,000 |
| Bombay ... | 8,599,000 | 2,796,000 | 2,562,000 | 3,859,000 | 195,000 | 194,000 | 182,000 | 1,583,000 | 734,000 |
| Bihar and Orissa | 17,634,000 | 3,673,000 | 1,233,000 | 5,545,000 | 194,000 | 32,000 | ... | 3,542,000 | 625,000 |
| Burma ... | 5,179,100 | 1,075,000 | 71,000 | 271,000 | 73,000 | 2,000 | ... | 821,000 | 723,000 |
| Central Prov. } Berar | 10,525,000 | 2,043,000 | 380,000 | 1,652,000 | 133,000 | 34,000 | ... | 1,562,000 | 1,093,000 |
| United Prov. ... | 22,906,000 | 8,552,000 | 2,230,000 | 6,563,000 | 467,000 | 271,000 | 26,000 | 5,053,000 | 998,000 |
| Punjab ... | 9,076,000 | 5,217,000 | 4,458,000 | 3,617,000 | 412,000 | 636,000 | 279,000 | 2,324,000 | 339,000 |
| Ceylon ... | 1,053,000 | 527,000 | 57,000 | 204,000 | 1,000 | ... | ... | ... | ... |

## TABLE VI

### CROPS GROWN in (acres sown 1930-31)

Add 000 to all figures

| Province | Rice | Wheat | Barley | Millet | Maize | Oilseeds | Sugar | Cotton | Jute | Tea | Fodder | Total sown |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bengal ... | 20,582 | 143 | 86 | 9 | 94 | 1,086 | 199 | 58 | 3,028 | 200 | 95 | 28,399 |
| Bombay ... | 3,260 | 2,285 | 36 | 14,271 | 173 | 1,869 | 65 | 3,830 | ... | ... | 2,345 | 34,018 |
| Madras ... | 11,678 | 20 | 3 | 7,683 | 150 | 5,330 | 115 | 2,041 | ... | 66 | 450 | 39,192 |
| Assam ... | 4,652 | ... | ... | ... | ... | 398 | 33 | 42 | 192 | 434 | ... | 6,646 |
| Bihar and Orissa... | 13,927 | 1,213 | 1,362 | 154 | 1,629 | 1,879 | 284 | 70 | 179 | 4 | 38 | 29,779 |
| United Provinces... | 6,844 | 7,660 | 4,310 | 4,533 | 2,383 | 911 | 1,488 | 822 | 3 | 6 | 1,186 | 43,750 |
| Delhi ... | ... | 41 | 12 | 104 | 3 | 8 | 5 | 4 | ... | ... | 19 | 240 |
| Punjab ... | 977 | 9,287 | 656 | 4,126 | 1,095 | 1,048 | 426 | 2,164 | ... | 10 | 4,420 | 30,265 |
| N.-W.F P. ... | 41 | 890 | 163 | 219 | 470 | 87 | 47 | 13 | ... | ... | 106 | 2,423 |
| Central Provs. } Berar } ... | 5,541 | 3,098 | 18 | 4,855 | 154 | 1,896 | 21 | 5,175 | ... | ... | 431 | 27,658 |
| Burma ... | 13,048 | 34 | ... | 468 | 218 | 1,929 | 20 | 373 | ... | 56 | 205 | 18,998 |
| British India ... | 80,932 | 24,797 | 6,693 | 36,507 | 6,458 | 16,458 | 1,370 | 14,200 | 3,402 | 775 | 9,300 | 261,913 |

## TABLE VII

IRRIGATION (1930–31)

| Province | Area Irrigated (in acres) | | | Percentage of Crops irrigated |
|---|---|---|---|---|
| | By Government canals | By tanks, wells, and private canals | Total Irrigated | |
| Bengal ... ... | 77,188 | ... | 1,734,892 | 6 |
| Madras ... ... | 3,700,567 | ... | 11,324,943 | 26 |
| Bombay ... ... | 3,209,387 | ... | 4,501,368 | 10 |
| Central Provinces ... | ... | ... | 1,130,022 | 4 |
| Bihar and Orissa ... | 775,241 | ... | 5,344,720 | 18 |
| United Provinces .. | 3,060,320 | ... | 11,215,589 | 29 |
| Delhi ... ... | 2,293 | ... | 66,862 | 30 |
| Burma ... ... | 663,356 | ... | 1,513,650 | 8 |
| Punjab ... ... | 10,238,527 | ... | 15,071,178 | 50 |
| Sind ... ... ... | 2,117,553 | ... | 2,240,277 | 39 |

## TABLE VIII

CROPS IRRIGATED (in thousands of acres) (1930–31)

| Province | Rice | Wheat | Millet | Pulses | Sugar | Cotton |
|---|---|---|---|---|---|---|
| Bengal ... ... | 1,492 | 15 | ... | 69 | 63 | ... |
| Madras ... ... | 8,477 | 3 | 720 | 1,100 | 111 | 137 |
| Bombay ... ... | 1,466 | 521 | 1,251 | 292 | 64 | 296 |
| Central Provinces ... | 976 | 44 | ... | 3 | 19 | ... |
| Punjab ... ... | 804 | 5,355 | 636 | 1,499 | 362 | 2,023 |
| United Provinces ... | 711 | 3,560 | 70 | 2,258 | 1,111 | 455 |
| Sind ... ... | 1,160 | 240 | 671 | 177 | 2 | 57 |

TABLE IX

FORESTS (1929-30)

| Province | Area square miles | Area of Forests | Proportion of forests to whole area | Timber Cubic feet; |
|---|---|---|---|---|
| Bengal ... ... ... | 77,521 | 10,583 | 13·5 per cent | 17,317,000 |
| Madras ... ... ... | 142,277 | 19,233 | 13·6 per cent | 23,800,000 |
| Bombay ... ... ... | 123,679 | 14,904 | 10·3 per cent | 54,744,000 |
| United Provinces .. ... | 106,248 | 5,217 | 7·0 per cent | 34,913,000 |
| Central Provinces ... ... | 99,920 | 19,641 | 19·8 per cent | 27,702,000 |
| Punjab ... ... ... | 99,200 | 5,320 | 6·8 per cent | 34,261,000 |
| Burma ... ... ... | 233,492 | 146,511 | 59·5 per cent | 119,254,000 |
| Coorg ... ... ... | 1,593 | 519 | 32·9 per cent | 400,000 |
| Bihar and Orissa ... ... | 83,054 | 3,032 | 3·7 per cent | 18,509,000 |
| Assam ... ... ... | 55,014 | 20,830 | 43·7 per cent | 12,773,000 |
| Andamans ... .. ... | 3,143 | 2,190 | 70·2 per cent | 1,601,000 |
| British India ... ... | 1,096,171 | 247,980 | 22·7 per cent | 300,000,000 |

## TABLE X

### Numbers of Chief Castes

All those with more than 2,000,000 are included.

| | | | |
|---|---|---|---|
| Ahir ... | 9,000,000 | Kumhar ... | 3,350,000 |
| Baniya ... | 2,800,000 | Kumbi ... | 8,300,000 |
| Brahman ... | 14,250,000 | Kurmi ... | 3,300,000 |
| Chamar ... | 11,260,000 | Lingayat ... | 2,700,000 |
| Dhobi ... | 2,000,000 | Mahar ... | 3,000,000 |
| Gond ... | 2,900,000 | Mal ... | 2,000,000 |
| Gujar ... | 2,200,000 | Maratha ... | 6,600,000 |
| Hajjom ... | 2,900,000 | Namasudra ... | 2,200,000 |
| Jat ... | 7,400,000 | Palli ... | 2,800,000 |
| Jolaha ... | 2,700,000 | Paraiyan ... | 2,400,000 |
| Kasbartta ... | 2,880,000 | Pathan ... | 3,500,000 |
| Kapu ... | 3,400,000 | Rajput ... | 9,800,000 |
| Kayastha ... | 2,300,000 | Sheikh ... | 33,400,000 |
| Koli ... | 2,500,000 | Teli ... | 4,200,000 |

## TABLE XI

### Occupations in India (1931)

| Occupation | Number of People in millions |
|---|---|
| Agriculture ... | 102·5 |
| Forestry ... | 0·5 |
| Fishing ... | 1·3 |
| Mining ... | 0·4 |
| Industry ... | 15·4 |
| Transport—Railways, etc. | 2·3 |
| Trade (Shopkeepers, etc.) | 7·9 |
| Government, Police, etc. | 1·8 |
| Priests, Doctors, Teachers, etc. | 1·0 |
| Domestic Service ... | 1·9 |
| Total occupied ... | 135·0 |

*

TABLE XII

EDUCATION IN 1930-31

| Province | Secondary Schools | | | Primary Schools | | |
|---|---|---|---|---|---|---|
| | Number | Boys | Girls | Number | Boys | Girls |
| Madras ... | 660 | 182,000 | 25,000 | 55,790 | 2,000,000 | 666,000 |
| Bombay ... | 663 | 100,000 | 19,000 | 14,901 | 859,000 | 247,000 |
| Bengal ... | 3,067 | 421,000 | 23,000 | 59,707 | 1,557,000 | 496,000 |
| United Provinces ... | 1,241 | 173,000 | 35,000 | 21,596 | 1,092,000 | 112,000 |
| Punjab ... | 3,941 | 653,000 | 42,000 | 7,338 | 393,000 | 96,000 |
| Bihar and Orissa ... | 883 | 121,000 | 7,000 | 28,135 | 771,000 | 109,000 |
| Central Provinces ... | 687 | 100,000 | 10,000 | 4,547 | 271,000 | 47,000 |
| Burma ... | 1,464 | 146,000 | 75,000 | 4,995 | 165,000 | 136,000 |
| British India. | 13,600 | 2,000,000 | 257,000 | 204,000 | 7,400,000 | 2,000,000 |

TABLE XIII

RAILWAYS, 1930-31

| Railway | Length miles | Number of passengers in year ('000 omitted) | Weight of goods carried in year (Tons) ('000 omitted) |
|---|---|---|---|
| Assam Bengal ... | 1,281 | 12,629 | 1,676 |
| Bengal and N. W. ... | 2,114 | 36,418 | 3,425 |
| Bengal-Nagpur ... | 3,326 | 24,887 | 14,633 |
| Bombay, Baroda and C. I. ... | 3,925 | 89,014 | 8,394 |
| Burma ... | 2,057 | 28,862 | 4,945 |
| Eastern Bengal ... | 1,894 | 46,408 | 7,227 |
| East Indian ... | 4,291 | 66,656 | 22,335 |
| Great Indian Peninsular ... | 3,700 | 55,923 | 10,565 |
| Jodhpur ... | 977 | 3,683 | 1,016 |
| Madras and S. M. ... | 3,230 | 43,057 | 6,371 |
| Nizam's ... | 1,238 | 11,589 | 2,615 |
| North-Western ... | 6,954 | 74,054 | 14,656 |
| Rohilkhand & Kumaon. | 571 | 6,678 | 1,053 |
| South Indian ... | 2,459 | 64,731 | 6,199 |
| Other Railways ... | 4,260 | 36,908 | 5,537 |

## TABLE XIV

PROPORTION OF MALES AND FEMALES (1931) PER 1,000 PERSONS

| Province | Males | Females |
|---|---|---|
| Bombay ... ... ... | 550 | 450 |
| Madras ... ... ... | 488 | 512 |
| Bengal ... ... ... | 538 | 462 |
| Central Provinces ... ... | 501 | 499 |
| Assam ... ... ... | 550 | 450 |
| Bihar and Orissa ... ... | 497 | 503 |
| United Provinces ... ... | 544 | 456 |
| Punjab ... ... ... | 584 | 416 |

## TABLE XV

POPULATION OF TOWNS AND CITIES (1931)

| | | | | | |
|---|---|---|---|---|---|
| 1. | Calcutta (with Howrah) | 1,485,582 | 18. | Allahabad | 182,914 |
| 2. | Bombay | 1,161,383 | 19. | Madura | 182,018 |
| 3. | Madras | 647,230 | 20. | Srinagar | 173,513 |
| 4. | Hyderabad | 466,894 | 21. | Patna | 159,690 |
| 5. | Delhi | 447,442 | 22. | Mandalay | 147,932 |
| 6. | Lahore | 429,747 | 23. | Sholapur | 144,654 |
| 7. | Rangoon | 400,415 | 24. | Jaipur | 144,179 |
| 8. | Ahmedabad | 313,789 | 25. | Bareilly | 144,031 |
| 9. | Bangalore | 306,470 | 26. | Trichinopoly | 142,843 |
| 10. | Lucknow | 274,659 | 27. | Dacca | 138,518 |
| 11. | Amritsar | 264,840 | 28. | Meerut | 136,709 |
| 12. | Karachi | 263,565 | 29. | Indore | 127,327 |
| 13. | Poona | 250,187 | 30. | Jubbulpore | 124,382 |
| 14. | Cawnpore | 243,755 | 31. | Peshawar | 121,866 |
| 15. | Agra | 229,764 | 32. | Ajmer | 119,524 |
| 16 | Nagpur | 215,165 | 33. | Multan | 119,457 |
| 17. | Benares | 205,315 | 34. | Rawalpindi | 119,284 |

## TABLE XVI

### Languages (1931)

| Language | Number of speakers | |
|---|---|---|
| | Men | Women |
| Western Hindi ... ... ... | 37,743,000 | 33,804,000 |
| Bengali ... ... ... | 27,517,000 | 25,952,000 |
| Telugu ... ... ... | 13,291,000 | 13,083,000 |
| Marathi ... ... ... | 10,573,000 | 10,317,000 |
| Tamil ... ... ... | 10,073,000 | 10,339,000 |
| Punjabi ... ... ... | 8,799,000 | 7,040,000 |
| Rajasthani ... ... ... | 7,271,000 | 6,627,000 |
| Kanarese ... ... ... | 5,690,000 | 5,516,000 |
| Oriya ... ... ... | 5,485,000 | 5,709,000 |
| Gujarathi ... ... ... | 5,610,000 | 5,240,000 |
| Burmese ... ... ... | 4,332,000 | 4,522,000 |
| Malayalam ... ... ... | 4,533,000 | 4,605,000 |
| Lahuda ... ... ... | 4,603,000 | 3,963,000 |
| Sindhi ... ... ... | 2,200,000 | 1,807,000 |
| Bhili ... ... ... | 1,110,000 | 1,079,000 |
| Assamese ... ... ... | 1,042,000 | 957,000 |
| Western Pahari ... ... | 1,211,000 | 1,115,000 |
| Pashto ... ... ... | 895,000 | 742,000 |
| Eastern Hindi ... ... | 4,210,000 | 2,657,000 |
| Kashmiri ... ... ... | 783,000 | 656,000 |
| Balochi ... ... ... | 344,000 | 284,000 |
| Munda Languages ... ... | 2,310,000 | 2,299,000 |
| Tibeto-Chinese... ... ... | 6,909,000 | 7,101,000 |

## TABLE XVII

### What India Sells and What India Buys

(All parts of India)

| Country | Things India sells | Things India buys |
|---|---|---|
| United Kingdom | Tea, jute, jute manufactures, oil-seeds, food grains, hides and skins. | Iron and steel goods, machinery, hardware, railway engines, motor cars, cotton, liquors, paper. |
| Straits Settlements | Rice, cotton, jute ... | Spices, betelnuts, oils sugar, silk, tin. |
| Ceylon ... | Rice, coal, cotton goods. | Tea, copra, spices. |
| Hongkong ... | Cotton goods, jute, opium. | Silk and silk goods, sugar. |
| Egypt ... | Rice, cotton, jute ... | Salt. |
| Mauritius ... | Rice, jute ... | Sugar. |
| Canada ... | Jute, tea ... | Motor cars. |
| South Africa ... | Jute ... | ..... |
| Australia ... | Jute bags, tea ... | Wheat, coal. |
| Japan ... | Raw cotton, rice, skins... | Cotton goods, matches, silk goods, glassware, earthenware. |
| United States ... | Jute, cloth, hides and skins, lac, oilseeds, tea. | Machinery, mineral oil, iron and steel, cotton goods. |
| Java ... | Jute bags, rice ... | Sugar. |
| Germany ... | Jute, rice, raw cotton, hides, oilseeds. | Dyes, iron and steel, machinery, hardware, paper, motor cars. |
| Belgium ... | Raw cotton, oilseeds, jute, manganese. | Iron and steel goods. |
| France ... | Oilseeds, jute, cotton ... | Liquors, rubber goods. |
| Italy ... | Raw cotton, oilseeds, jute. | Cotton goods, metal goods. |
| Holland ... | Lac, raw cotton ... | Cotton goods, metal goods. |
| China ... | Cotton goods, jute, tea, | Silk and silk goods, tea. |
| South America... | Jute ... ... | ..... |

## TABLE XVIII

COTTON MILLS (1930-31)

| Province | Number | People employed | No. of looms | Number of spindles |
|---|---|---|---|---|
| Madras ... | 22 | 35,000 | 5,000 | 753,000 |
| Bombay ... | 179 | 243,000 | 124,000 | 5,597,000 |
| Bengal ... | 14 | 17,900 | 4,800 | 364,800 |
| United Provinces. | 22 | 27,500 | 8,700 | 640,000 |
| Central Provinces. | 11 | 21,400 | 6,500 | 333,000 |
| Hyderabad ... | 4 | 4,000 | 1,300 | 86,000 |
| Mysore ... | 5 | 7,800 | 2,000 | 138,000 |
| C. I. ... | 6 | 11,200 | 5,000 | 181,000 |
| Baroda ... | 15 | 8,600 | 3,300 | 230,000 |

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